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**ICONES PLANTARUM FORMOSANARUM**

**NEC NON ET**

**CONTRIBUTIONES AD FLORAM  
FORMOSANAM.**

**IV.**

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**AUCTORE**

**B. Hayata.**

7227

TO HIS EXCELLENCY COUNT SAMATA SAKUMA,  
GOVERNOR GENERAL OF FORMOSA.

SIR,

I have the honour to submit to your Excellency the fourth volume of the *Icones Plantarum Formosanarum, nec non et Contributiones ad Floram Formosanam* by B. HAYATA, D. Sc.

KAKICHI UCHIDA,  
CIVIL GOVERNOR OF FORMOSA.

September 1, 1914, Taihoku.





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## INTRODUCTION.

As was stated in the third volume of this work, several more volumes were to be devoted to the results of studies of new materials which were then on my hands. The first part of these studies was published in Vol. III. under the heading, "Contributions to the Flora of Formosa, Part I." The present volume is principally devoted to the second part of the same studies. It also contains some plants collected during my last excursion to Formosa, in the spring of this year.

The volume contains 285 species and several varieties, of which 167 are proposed as new species, and 9 as new varieties of known species, while 118 are identified with species which were known from the island or from other countries. Of genera contained in this volume, one genus, *Arisanorclis*, is proposed as new, and thirteen genera are mentioned as new to the flora of the island. The genera new to our knowledge of the flora are shown in the following list.

<i>Aconitum</i>	<i>Moneses</i>	<i>Cryptostylis</i>
<i>Ailanthus</i>	<i>Boschniakia</i>	<i>Cystopteris</i>
<i>Corylopsis</i>	<i>Beilschmiedia</i>	<i>Leucostegia</i>
<i>Modecca</i>	<i>Hydrocharis</i>	
<i>Cornus</i>	<i>Arisanorclis</i>	

Genera,\* species\* and varieties\* now to be added to the flora of Formosa number as many as 13 genera, 194 species and 9 varieties. Thus, up to the present date, the total number of species of the flora, so far as is known, is 3112, belonging to 891 genera and 158 families.

In the present volume, floral sketches of some of my species already described are given, and the original descriptions are repeated, as I desire to give a clear conception of my species to any one who examines them to see whether they are to be recognized as genuine new species or to be reduced to known species.

Of the species mentioned in this work, I have proposed more than

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\* It should be understood that plants outside of the island are not counted in this number, although they are mentioned in this volume.

half as new. In so doing, I shall be accused of having described too many new species, and shall be censured for having paid but little attention to known species. But such is not at all the case. I have, as far as necessary, consulted all accessible literature bearing on my work, and have made exhaustive comparisons with all the herbarium specimens preserved in our institutes at Taihoku and Tōkyō. It should be understood, as I stated in my former paper,\* that our herbaria are as yet very inadequate for the working up of my materials which are really extensive. It frequently occurs with us that foreign herbarium specimens for comparison being very scanty, we are compelled to consult original or reproduced descriptions, instead of herbarium specimens themselves.

In this way have my own investigations been made. I have commenced my work with the utmost care, examining all descriptions of the species with which my plants might be identified. In those cases in which the descriptions of plants under examination were exhaustive or at least available for identification, the work could be carried on with some measure of satisfaction. Much more satisfactory has it been when they were accompanied with figures. When, however, the descriptions were very short and imperfect and not accompanied with any figures, the work of identification was utterly disappointing if not impossible. In cases where I could not satisfactorily identify my plants with any known species in consequence of the imperfection of the given descriptions or the want of herbarium specimens, the only work that was possible for me was to describe my plants fully and accurately as new species, giving their affinities. This has been most frequently the case with ferns. As stated by Sir WILLIAM HOOKER,\*\* the identification of ferns with given descriptions is a very difficult task, and in some cases utterly impossible, if the descriptions are not accompanied with figures.

For us to whom comparison with herbarium specimens can be but imperfectly carried out, the most important work to be undertaken is not so much the identification of plants with known species, as the study of their

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\* HAYATA, B.—Materials for a Flora of Formosa, in Journ. Coll. Sci. Imp. Univ. Tōkyō, XXX-1, p. 2.

\*\* HOOKER, Sir WILLIAM JACKSON.—A second Century of Ferns (1861), p. VII.



characters and affinities. Works which contain full descriptions and illustrations of plants of the regions in question, should present important materials for students of phytogeography and of systematic botany. Works which deal only with the names of plants, perhaps erroneously classified, as would probably be the case in circumstances like ours, would be likely to lead students of phytogeography to erroneous results, and would puzzle students of systematic botany with an endless confusion of nomenclature of plants.

In this work, plants, the identification of which has been satisfactorily made, are referred to known species. In this case, I usually have made it clear how I have identified them with the species to which they have been referred,—by means of a comparison of herbarium specimens, of figures or of descriptions found in literature. But in cases in which identification has not been satisfactorily made, plants have been described as new with affinities. In some cases, my species may be the same as those which I have given as their allies under descriptions of plants in question. Therefore, though many of my new species should be reduced to synonyms, still I have little doubt that my work will present important material to students of the flora of Eastern countries. No one is more conscious than I that errors may have crept into my work; but the errors in most cases are of a nature inevitable in work of this kind done in the East, far from Western herbaria, and will doubtless easily be detected by those who are familiar with the species, when they see merely my descriptions and figures without troubling themselves to look at my original types.

As stated above, nothing is more difficult than to identify plants by short descriptions unaccompanied with figures. Original descriptions ought, therefore, to be very clear, accurate and exhaustive, and if possible, ought to be supplemented with figures, so that one can identify one's plants easily and satisfactorily. For one to whom original types are easily accessible, it is not difficult to work with short descriptions, as one may go to see the types themselves, if one finds original descriptions unavailable for identification. But, for one to whom original types are not accessible, when descriptions are too short for use, the work cannot but be very difficult and

sometimes impossible. Exhaustive descriptions are, therefore, indispensable for us to whom herbarium specimens for comparison are not sufficient and types are practically inaccessible.

Descriptions of new species ought to be accessible to all botanists and are necessary, except in the case of those of certain circulation of which types are at hand. Moreover, type-specimens are not things which can be widely distributed; they may be rare, or even extinct. Descriptions, however, when published, can be easily obtained, and the excuse of inaccessibility is not admissible. Accordingly, original descriptions should be so exhaustive that they may be substitutes for type-specimens and that one can work with descriptions in cases where the types are not available. In this sense, Eastern botanists are in no more urgent need of exhaustive descriptions of plants of which types are preserved in Western herbaria, than Western botanists are of those of which types are preserved in Eastern herbaria. The same can be said of all botanists either with reference to different countries or to different herbaria. It is also much to be desired that the multiplication of type-specimens proposed by SWINGEL\* should be carried out by all botanists who have to describe new species. Though the distribution of merotypes is most important for taxonomic botany, yet it is far too difficult, and in some cases impracticable, to make it obligatory on all authors of new species.

Descriptions might be very short so long as the species belonging to the same genus were few in number. As the species increase year after year through the exploration of new territories or other causes, descriptions will tend to become fuller and more exhaustive. In such cases, original descriptions of two or three lines only for the sake of priority should be absolutely avoided.

It is much to be desired that the following resolutions should be considered at the next meeting of the International Botanical Congress to be held in London next year, if the present overwhelming war is then over, viz: (1), that in the case of new species, descriptions of two or three lines only for the sake of priority should be as far as possible avoided; (2), that authors who are compelled to describe new species from imperfect

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\* SWINGEL, W. T.—Merotypes as means of multiplying botanical types.

specimens should supplement their original descriptions with perfect materials as soon as possible.

As this volume is principally devoted to studies of the Orchideæ and Pteridophyta, a few remarks on the classification upon which the two families is based will not be out of place. In working up my collections of orchids, I have principally followed BENTHAM and HOOKER, sometimes LINDLEY, KING and PANTLING, and PFITZER. As to the classification of Monandraceæ-Acrotonæ, many authorities do not agree. \*PFITZER's system which, taking into account whether the inflorescence is terminal or lateral, distinguishes Acranthæ and Pleuranthæ, or, on the basis of the veneration of the leaves being either convolutive or duplicative, makes many divisions in the above named tribes, proved to be impracticable in working up my materials. Moreover, I have found many doubtful cases, so far as inflorescence being terminal or lateral is concerned, and there are even more cases in which it is impossible to determine whether the veneration of the leaves is duplicative or convolutive. KING and PANTLING's Orchids of the Sikkim Himalayas in Ann. Roy. Bot. Gard. Calc. Vol. VIII. and several other illustrations given in the same Annals have been very useful to me in identifying and comparing my collections of orchids.

As to ferns and especially to the genus, *Dryopteris*, I have followed C. CHRISTENSEN's system in his Index Filicum. His classification of the subgenera of the genus\*\* is based principally on the presence or absence of hairs and on their structures. This newly founded system is certainly one of the most natural arrangements and has proved to be easily applicable to Formosan ferns. But, as far as Japanese and Formosan species are concerned, there are a few cases in which I can scarcely agree with the author. Some species which are taken by him as types of a subgenus do not show the characters of the same subgenus, after the delimitation of the latter as stated by him. For example, *Dryopteris Miqueliana* (Max.) C. CH. which is taken as one of types of the subgenus, *Eudryopteris*, which after CHRISTEN-

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\* PFITZER, E.—*Orchilaceæ* in ENGLER u. PRANTL, nat. Pfl.—fam. II-6, p. 76.

\*\* CHRISTENSEN, C.—On a natural classification of the species of *Dryopteris*, pp. 74-76, and a monograph of the genus *Dryopteris* part-1, pp. 61-63.

SEN's delimitation should have no true hair, has true unicellular hair; while *D. Sieboldii* (van HOUTTE) O. Ktze, which is taken as another type of the same subgenus, has true multi-cellular hair. I have no doubt, however, that the two just referred to could be quite naturally assigned to the subgenus named, as might be seen from their general characters. With a very few exceptions, his delimitation of subgenera and classification of the genus are very natural, and I have, therefore, followed his system solely.

As to my new species mentioned in this volume, I have described them as accurately and fully as possible and in almost all cases, save where the number of pages or the want of materials forbade, I have supplemented them with figures, in plates or in the text. Accordingly, I believe that any one who is familiar with the plants in question can at once decide whether my species should be recognized, or should be reduced, without taking the trouble to look at my types. As to ferns, I have added to full descriptions photographs of whole forms and magnified sketches of pinnæ or pinnules, scales and sori. As a type for description, I have taken the largest form possible; for describing pinnæ or pinnules, I have taken basal ones; and for angles of pinnæ, I have taken the middle ones. Great attention has been paid to venation and the structure of hairs.

All the species of phanerogamous plants are here arranged, as in the preceding volumes, after the system of BENTHAM and HOOKER, while those of vascular cryptogamia are arranged after the system of ENGLER and PRANTL. The scope of the present volume is the same as that of the preceding volume.

In conclusion, I avail myself of this opportunity to tender my hearty thanks to the officials of the Government of Formosa to whom I am much indebted for help in the collection of materials and in the publication of this work.

B. HAYATA.

August 31, 1914, Taihoku and Tōkyō.



## Contributions to the Flora of Formosa.

## II.

## Ranunculaceæ.

*Aconitum* LINN.

**Aconitum Fukutomei** HAYATA sp. nov. Caulis non visus. Ramuli flexuosi subcomplanati læves tenuiter hirsuti (pilis patentibus). Folia radicalia ignota. Folia in ramulo tripartita breve petiolata vel 3-foliolata, foliolis subæqualibus, terminali in circumscriptione obovato-lanceolato  $3\frac{1}{2}$  cm. longo  $1\frac{1}{2}$  cm. lato apice acuminato basi cuneato ad petiolulum 2–3 mm. longum abeunti margine laciniato, (laciniis linearibus  $1-\frac{1}{2}$  cm. longis  $2\frac{1}{2}$ –2 mm. latis), foliolis basilaribus laciniatis, utraque pagine hirsuta, nervis venisque supra impressis subtus elevatis, petiolis communibus 8 mm. longis. Flores versus apicem ramulorum racemosim dispositi vel ad axillas foliorum superiorum solitarii subnutantes, pedicellis  $2\frac{1}{2}$  cm. longis hirsutis sursum bracteis 2 alternis instructis, bracteis linearibus 5 mm. longis; flores violacei, a basi sepali antici usque ad apicem galeæ 3 cm. longi. Sepalum posticum galeæforme 22 mm. longum 1 cm. latum et profundum dorso rotundato-convexum intus extusque hirsutum apice breve cuspidatum, cuspidate triangulari obtusa reflexa, basi subcuneato-contractum; sepala lateralibus late rotundato-flabelliformia 14 mm. longa totiusque lata apice late rotundata basi arcuato-cuneata latere superiore interiore arcuata, latere inferiore exteriori arcuata ad basin 2 mm. latam truncata, utraque pagine hirsuta erecta prope apicem margine exteriori recurva cætera plana; sepala antica ovato-oblonga vel obovato-oblonga 13 mm. longa 5–6 mm. lata apice obtusa vel cuspidato-acuta ad summum semper obtusa basi subito brevius cuneato-contracta utraque hirsuta ad basin 1 mm. lata margine tenuiter interiore recurva. Petala superiora 2, λ-formia longe unguiculata apice cucullata sub galea recondita, unguibus linearibus 9 mm. longis 1 mm. latis intus profunde sulcatis hirsutis vel subbarbatis (pilis patentibus) basi ~-formiter recurvis subcomplanatis, cucullis ?-formibus 9 mm. longis 1–2 mm. latis apice recurvis deorsum longe

linearibus basi  $\pm$  dilatatis ad extremitatem brevissime 2-lobis vel retusis tenuiter barbatis; petala 3 inferiora minima angustissime linearia 3 mm. longa  $\frac{1}{3}$  mm. lata apice obtusa basi haud contracta subglabra vel tenuiter barbata enervia. Stamina  $\infty$  glabra, filamentis exteriore recurvis 5–6 mm. longis a medio usque ad basin alatis, partibus alatis 3 mm. longis cum alis 1 mm. latis apice sagittatis vel gradatim ad partem exalatam abeuntibus, antheris reniformibus 1 mm. latis minus 1 mm. longis utrinque emarginatis. Carpella distincta pauca circ. 3 fusiforme linearia  $\pm$  obliqua cum stylo  $4\frac{1}{2}$  mm. longa glabra.

HAB. Mt. Kiraishuzan, leg. K. FUKUTOMÉ, Oct. 1913.

As the specimen is rather imperfect, exact determination is not possible. It should be comparable to some extent to *A. sachalinense* F. SCHMIDT in the linearly parted or lacinate leaves and in the size and hairy form of the flowers; but the new species is widely different from the congener in having glabrous filaments and more opened dorsal sepals.

### Ternstroemiaceæ.

#### *Actinidia* LINDL.

**Actinidia callosa** LINDL. var. **formosana** FINET et GAGN. Fl. As. Or. II. (1907) p. 20.

*Actinidia Championi* HAYATA in Herb. Bot. Gard. Tōkyō (non BENTH).

HAB. Mt. Taiton, leg. G. NAKAHARA, Aug. 1905, (No. 262-A).

Determined by Mr. W. R. PRICE at Kew.

### Malvaceæ.

#### *Gossypium* LINN.

**Gossypium hirsutum** var. **religiosum** WATT.

HAB. Shizangan, leg. T. MAKINO, Nov. 1896.

Determined by Mr. SPRAGUE at Kew, through Mr. W. R. PRICE.

### Simarubeæ.

#### *Ailanthus* DESF.

**Ailanthus glandulosa** DESF. var. **Tanakai** HAYATA n. v. Arbor?  
Folia (in specimine nostro singulo) 55 cm. longa 26 cm. lata in circumscrip-

tionē oblonga 27-foliolata, foliolis suboppositis, jugis  $3\frac{1}{2}$ -4 cm. remotis, inferioribus majoribus obliquis ovato-oblongis 13 cm. longis  $5\frac{1}{2}$  cm. latis apice subito acuminatis, (acuminibus linearibus) basi obliquis latere interiore latioribus 3 cm. latis latere exteriorē 2 cm. latis, basi in latere interiore truncatis, ad angulum partis truncatæ glandulis 1-2 instructis, basi in latere exteriorē acutis vel cuneato-acutis ad angulum partis acutæ glandulis 1 instructis, chartaceis, utraque pagine glaberrimis supra ad costas impresso-sulcatis, costis versus sulcos distincte graciliter elevatis, venis lateralibus utroque latere costæ 10-11, mediis a costâ angulo  $50^\circ$  egressis supra tenuiter impressis vel planis, costis venisque subtus distincte sed graciliter elevatis, venulis minute reticulatis, subtus subglaucis vel pallidis, margine integris; glandulis utroque latere margine 1-2 complanato-globosis 1 mm. in diametro supra planis subtus prominente elevatis ad centrum depressis, petiolulis 2- $2\frac{1}{2}$  cm. longis subteretibus basi subito dilatatis, petiolis 12 cm. longis subteretibus basi  $\pm$  dilatatis. Flores ignoti. Paniculæ fructiferæ cymosæ 25 cm. longæ 30 cm. latæ, pedicellis ultimis gracilibus 2-1 cm. longis. Samera generaliter una in receptaculo singulo sed interdum 2 lineari-oblonga  $\pm$  obliqua apice obtusissima sursum  $\pm$  tortuosa basi oblique obtusa latere raphæ acuta, latere opposito obtusissima vel rotundata, venoso-reticulata 1-sperma, semine ad centrum sito.

HAB. Tōyenchō: Shibutsuke, in montibus 3000 ped. alt., leg. I. TANAKA, Nov. 1913.

Very near the type; but differs from it in the quite glabrous leaves and in the samaræ which in this new variety are broader and usually convexed at the margin on both sides at the base, while in the type they are convex on one side, but concave on the other.

## Rhamneæ.

### *Rhamnus* LINN.

**Rhamnus acuminatifolia** HAYATA Ic. Pl. Formos. III. p. 62. Descriptio auctata: Flores subumbellati 9-10-florati, pedunculis semper solitariis axillaribus 1- $\frac{1}{2}$  cm. longis hirsutis apice cicatricibus pedicellorum 5-6 notatis, cicatricibus rotundatis cupulæformibus ad centrum depressis, pedicellis cum pedunculo articulatis ad apicem pedunculi radiatim dispositis 4 mm. longis

hirsutis apice ad cupulas calycium expansis. Cupula calycis late campanulata 1 mm. longa 2 mm. lata extus hirsuta intus glabra discis flavis obtecta. Lobi calycis valvati triangulares 2 mm. longi  $1\frac{1}{4}$  mm. lati apice triangulari-obtusi extus subglabri plani intus glabri sursum prominente deorsum tenuiter costati post anthesin a cupula decidui. Petala late obovata cum sepalis alterna valde concava minus 1 mm. longa  $\frac{3}{8}$  mm. lata apice 2-lobata basi unguiculata  $\frac{1}{10}$  mm. longa glabra. Stamina 5, cum petalis opposita minuta cum filamentis 1 mm. longa, filamentis  $\frac{1}{10}$  mm. longis, antheris ovatis  $\frac{4}{5}$  mm. longis apice connectivis mucroniforme productis. Ovarium late ovato-rotundatum 1 mm. longum, stylo validiusculo columniformi  $\frac{2}{3}$  mm. longo apice brevissime 3-lobato.

HAB. Ritōzan, ad 6500 ped. alt., leg. T. KAWAKAMI, Juli. 1913, (No. 9).

## Leguminosæ.

### *Acacia* WILLD.

**Acacia confusa** MERRILL var. **Inamurai** HAYATA n. v. Arbor circ. 10 m. alta, circ. 2 ped. in circumscriptione. Phyllodia latere compressa falcato-linearia lanceolata 10-8 cm. longa 7-4 mm. lata apice acuminata prope apicem subito angulo recto falcata basi attenuata in stipitem latere compressum  $1\frac{1}{2}$  mm. longum abeuntia membranaceo-coriacea utraque pagine manifeste 3-nervia, nervis parallelis, inter nervos 1-vena, venis parallelis, inter venas et nervos venulis longitudinaliter reticulatis, nervis venis venulisque utroque latere elevatis, margine integerrima sub lente nervata. Flores ignoti. Legumina valde complanata  $\pm$  falcata circ. 10 cm. longa 7-8 mm. lata apice obtusa basi subito attenuata ad stipitem 5 mm. longum abeuntia valde complanata ad suturas utrasque costulata, costulis elevatis, facie  $\pm$  depressa, inter cava seminum vix vel haud constricta, cavis seminum  $\pm$  elevatis, valvis 2 chartaceis fusco-cinerascentibus. Semina ellipsoidea vel complanata apice rotundata basi obtusissima ad extremitatem breve obscureque apiculata  $6\frac{1}{2}$  mm. longa  $3\frac{1}{2}$  mm. lata  $1\frac{1}{2}$  mm. crassa, utraque facie annulariforme maculata, annulis singulis  $4\frac{1}{2}$  mm. longis 2 mm. latis ellipticis, facie fusco-fulvescentia.

HAB. Kōshūn: Kūraru, leg. T. INAMURA, Oct. 1913, (fr.)

Very near the type, differs only by its much narrower leaves, pods and seeds.



It grows on the very windy side of the shore mountains in the southern part of Formosa. According to Mr. T. INAMURA, there is no difference between the type and the variety in the saplings. I doubt if this be not a mere form of the type.

## Rosaceæ.

### *Rubus* LINN.

***Rubus glandulosopunctatus*** HAYATA sp. nov. Frutex ramosissima, ramis et ramulis flexuosis sublaevibus vel tenuissime striatis, cum foliolis calycibus petiolisque tenuiter hirtellis glanduloso-punctatis, punctis flavis minutis, aculeatis, aculeis cuspidato-triangularibus latere complanatis 2 mm. longis  $1\frac{1}{2}$  mm. latis acutis leviter desuper recurvis. Folia 7-5-foliolata in circumscriptione lanceolato-ovata circ. 10 cm. longa 4-5 cm. lata, foliolis lateralibus oppositis subaequalibus vel superioribus  $\pm$  minoribus, mediis ovato-oblongis  $\pm$  obliquis 22 mm. longis 1 cm. latis apice acutis basi obtusissimis vel rotundatis chartaceis duplicato-dentatis, (dentibus primariis 4 mm. remotis, denticulis secundariis 1 mm. remotis triangulari-acutis), sessilibus, venis et venulis supra non visis costis venisque subtus prominentibus, venulis subtus minute reticulatis; foliolo terminali ovato-lanceolato  $4\frac{1}{2}$  cm. longo  $1\frac{1}{2}$  cm. lato apice acuminatissimo basi obtusissimo margine duplicato-dentato, (dentibus primariis  $\frac{1}{2}$  cm. remotis 4 mm. altis, dentibus secundariis minutis 1 mm. a se remotis triangulari-acutis), venis lateralibus supra tenuiter impressis utraque latere costæ circ. 10 rectis ad apicem dentium primariorum attingentibus angulo  $35^\circ$  a costa egressis rectis subtus prominentibus, petiolis communibus  $2\frac{1}{2}$  cm. longis remotissime aculeatis gracilibus, rhachibus cum petiolulo folioli terminalis gracilibus 3 cm. longis, jugis foliolorum a se  $1\frac{1}{2}$ -1 cm. remotis, stipulis linearibus 7 mm. longis 1 mm. latis acuminatis. Flores ad axillas foliorum superiorum solitarii vel breve racemosi, racemis 1-2-floratis, pedicellis (vel pedunculis) erectis rectis. Cupula calycis 7 mm. in diametro extus ad centrum depressa, lobis ovato-triangularibus cum cuspidibus 7-8 mm. longis apice cuspidatis (cuspidibus 2 mm. longis vel longioribus) basi haud constrictis 4 mm. latis extus dense hirsutis vel glanduloso-punctatis intus velutinis crassiusculis margine tenuioribus. Petala rotundata 8-9 mm. in

diametro apice rotundata obtusa vel leviter emarginata basi brevissime unguiculata, (unguibus  $1\frac{1}{2}$  mm. longis ad basin 1 mm. latis), margine integra subrepanda hirsuta facie extus dense villosa intus tenuiter hirsuta basi crassiuscula alba. Stamina  $\infty$  ad marginem cupulæ calycis inserta pluri-seriata, filamentis  $3\frac{1}{2}$  mm. longis  $\frac{1}{4}$  mm. latis sursum constrictis, loculis antheræ lineari-oblongis  $\frac{1}{2}$ – $\frac{2}{3}$  mm. longis. Ovarium semi-obovoideum 1 mm. longum  $\frac{1}{2}$  mm. latum apice rotundatum basi cuneatum latere valde complanatum apice dorso glanduloso-muricatum facie glabrum, stylo ad latus apicis ovarii sito  $1\frac{1}{2}$  mm. longo filiformi apice  $\pm$  dilatato truncato. Receptaculum ellipsoideum cum stipitibus 4 mm. longum hirsutum basi pilosum. Syncarpium elliptico-globosum 7 mm. longum, stylis purpurascentibus, cupula reflexa.

HAB. Ritōzan, ad 6000 ped. alt., leg. T. KAWAKAMI, Aug. 1913.

Near *Rubus rosæfolius* var. *Maximowiczii* FOCKE, but differs from it in having minute glandular dots all over the plant.

## Hamamelideæ.

### *Corylopsis* SIEB. et ZUCC.

**Corylopsis stenopetala** HAYATA sp. nov. Frutex? Rami recti teretes cinereo-rubescences lenticellis minutis elevatis notati deorsum glabri sursum hirsuti, prope summum dense villosi. Folia oblonga ovato-oblonga maxima 11 cm. longa  $4\frac{1}{2}$  cm. lata apice acuminatissima vel cuspidata, (cuspidibus triangulari-linearibus  $1\frac{1}{2}$  cm. longis 6 mm. latis, ad summum aristatis), deorsum a medio usque ad prope basin subcuneata ad basin truncata et leviter cordata, margine a basi cuspidis usque ad medium distincte et tenuissime aristato-dentata, (dentibus a se 7–8 mm. remotis latere superiore  $1\frac{1}{2}$  mm. longis latere inferiore 6–7 mm. longis ascendentibus brevissimis ad summum aristis  $1\frac{1}{2}$  mm. longis instructis), a medio ad basin subintegra sed remotissime aristata, (aristis a se 1–3 cm. remotis), chartacea, (supra costis venisque distincte impressis, subtus distincte prominenteque elevatis, venulis subtus transverse tenuissime reticulatis elevatis supra laud vel vix visis, venis primariis lateralibus utroque latere costæ 9 rectis ad apicem dentium attingentibus a costa angulo  $35^\circ$  egressis), basi subtrinervia supra subglabra subtus ad costas et venas tenuiter longèque barbata, barbis adpressis, petiolis

1½ cm. longis gracilibus subteretibus dense hirsutis. Spicæ subovatæ 2½ cm. longæ 2 cm. latæ; pedunculis in parte inferiore 5-6 nodosis ad nodos bracteatis et articulatis 1 cm. longis dense villosis bracteis basilaribus sterilibus imbricatis alabastrum spicæ complete involventibus, inferioribus sterilibus minoribus, mediis sterilibus majoribus, superioribus (in pedunculo) sterilibus gradatim minoribus ad bracteam fertilem abeuntibus, bracteis mediis (in pedunculo) ovatis valde concavis 1½-2 cm. longis 1½ mm. latis apice acuto-obtusis, basi obtusis circ. 5-nerviis basin spicæ amplexantibus extus dense villosis intus tenuiter hirsutis. Pars florifera spicæ 2 cm. longa villosa densissime florata, bracteis (fertilibus) sub flore uno singulis late ovatis inferioribus 8 mm. longis totiusque latis apice triangularibus obtusis basi obtusis valde concavis florem semi-amplexantibus extus intusque dense villosis margine subintegris, bracteolis sub flore singulo duabus ovato-linearibus ± falcatis concavis 4 mm. longis 2 mm. latis apice basique obtusissimis extus dense intus tenuiter villosis. Calycis tubus late tubuloso-campanulatus 2 mm. longus 2½ mm. latus extus tenuiter subpilosus (pilis simplicibus vel fasciculatis) vel subglaber, ore brevissime 5-dentatus, dentibus latissime brevissime triangularibus vel obsoletis vel semirotundatis ½ mm. longis totiusque latis barbatis. Petala 5 ad orem calycis affixa cum dentibus calycis alterna spathulata 4½ cm. longa 1½ mm. lata sursum obovata deorsum linearia, parte obovata 1½ mm. longa minus lata, parte lineari 3 mm. longa ⅔-½ mm. lata, basi ⅓ mm. lata, utraque glaberrima. Stamina 5 erecta recta exserta cum petalis alterna ad orem calycis inserta, filamentis linearibus valde complanatis 1 mm. latis 7 mm. longis sursum gradatim angustioribus, antheris quadrangularibus 1 mm. longis minus latis subrectangularibus cum filamentis toto glabris. Glandulæ 5 clavato-complanatæ cum staminibus alternæ 1 mm. longæ ⅔ mm. latæ apice ± dilatatæ ad centrum impressæ. Ovarium fere inferius vel semi-inferius 2-loculare, loculis 1-ovulatis, ovulis ad summum placentæ pendulis anatropis raphis ventralibus. Styli 2 a basi distincti 6 mm. longi teretes basi dilatati ad ovarium abeuntes, sursum latere profunde sulcati prope summum muricato-tuberculati, sursum ± tortuosi.

HAB. Shinshikei, ad 3000 ped. alt., leg. TAYEMON ITÔ, Jan. 1913.

Near *Corylopsis Veitchiana* BEAN (Bot. Mag. t. 8349), but differs from it in

the very much larger bracts, much narrower petals and in many other points ; and from all other known species, this differs by the very narrow spatulate petals and ovate spikes and nearly truncate calyx.

## Passifloreæ.

### *Modecca* LAM.

**Modecca formosana** HAYATA sp. nov. = *Adenia formosana* HAYATA. Herba volubilis validiuscula. Caulis teres glaber cavus in exsiccato longitudinaliter rugulosus. Folia alterna petiolata palmatim 3-fida in circumscriptione pentagona maxima 11 cm. lata totiusque longa profunde 3-fida rarius 5-fida 3-nervia rarius 5-nervia, (nervis subrectis vel arcuato-divaricatis ad apicem segmentorum attingentibus a se angulo 45° divaricatis a basi usque 5 mm. altum se connatis), basi late truncata, parte truncata 6 cm. lata ad extremitatem subito attenuata, parte attenuata 3 mm. longa totiusque lata basi utroque latere auriculiforme cordata, auriculis supra in exsiccato rugosissimis, subtus ad centrum glandulis rotundatis subplanis  $\frac{1}{2}$  mm. in diametro instructis; nervis segmentorum lateralium excentricis, in basi 4 mm. a margine interiore distantibus basi a margine exteriori 12 mm. distantibus; segmentis lateralibus  $\pm$  interiore falcato-divaricatis linearibus, segmento centrali subrecto lineari vel lanceolato vel lineari-lanceolato chartaceo 10 cm. longo 22 mm. lato apice acuminato basi vix vel haud angustiore margine integro utraque glabro, costis venis venulisque utraque pagine elevatis, venis lateralibus primariis manifestis 8 a costa angulo 70° egressis; sinibus inter segmenta obtusissimis, sub sinu subtus glandulis minimis unis sitis; glandulis flavescentibus punctiformibus, petiolis circ. 2 cm. longis vel brevioribus subteretibus vel subtetragonis supra et utroque latere tenuiter sulcatis basi vix vel haud dilatatis glabris, stipulis fere obsoletis vel minutis late cuspidato-triangularibus  $\frac{1}{3}$  mm. longis; cirrhis simplicibus axillaribus 10 cm. longis deorsum teretibus supra medium 2-3-bracteatis (bracteis minutis) sursum dorso complanatis. Racemi axillares 1-2-florati longo pedunculati, pedunculis 3-6 cm. longis glabris teretibus supra medium flores singulos vel geminos lateraliter gerentibus, supra partem floriferam elongatis ad cirrhus simplices complanatos abeuntibus, bracteis sub basi pedicelli floris singulis triangulari-acuminatis 2 mm. longis  $1\frac{1}{2}$  mm. latis margine remote vel





Fig. 1, *Moevea formosana* HAYATA; a, the plant; b, basal portion of a leaf, showing glands, seen from above; c, the same, seen from below; d, a tendril; e, calyx of a female flower, expanded; f, a petal; g, an ovary; h, the same, in vertical section; i, a staminode with a glandule; j, another staminode; k, the same, seen from side; l, a fruit; m, a valve of the same; n, the same, seen from side; o, a seed; p, the same, seen from side; a, m and  $n \times \frac{2}{3}$ ; l, much reduced; others variously magnified.

obsolete denticulatis, bracteolis sub pedicello singulo duabus minutis triangulari-acutis  $\frac{1}{2}$  mm. longis, pedicellis infra medium articulatis 3–4 mm. longis teretibus glabris. Flores unisexuales. Fl. ♂: calyx fusiforme turbinatus vel tubiformis utrinque contractus vel apice semiclausus crassus 10–12 mm. longus 6–7 mm.

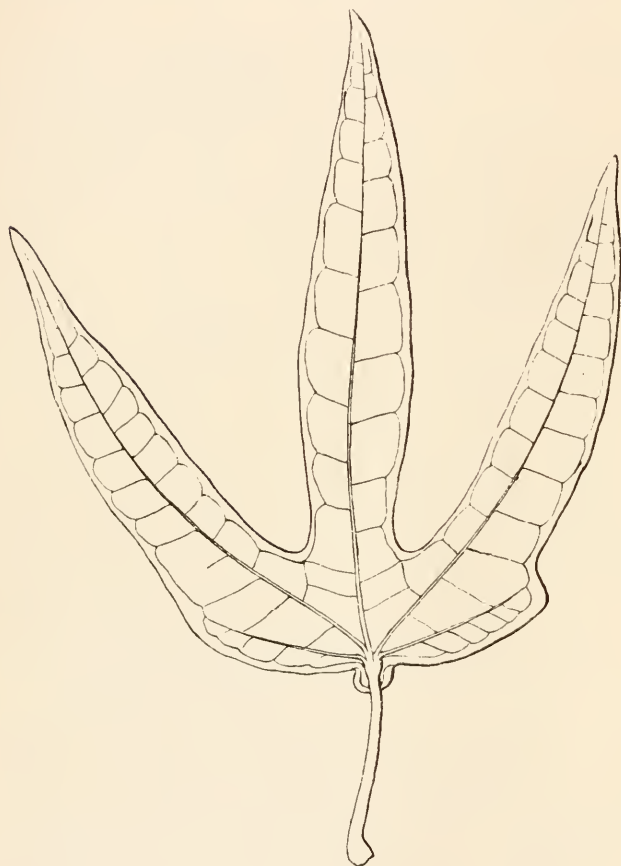


Fig. 2, *Modecca formosana* HAYATA; a leaf, seen from below; natural size.

latus facie 5-sulcatus inter sulcos impressim 1-striatus apice 5-lobatus (lobis triangularibus  $2\frac{1}{2}$  mm. longis  $1\frac{1}{2}$  mm. latis dorso convexis intus planis) basi intus verticaliter lamellatus, lamellis ad columnam staminalem abeuntibus margine liberis cum petalis oppositis cum calycis lobis alternis. Petala 5 cum calycis lobis alterna linearia  $2\frac{1}{2}$  mm. longa  $\frac{1}{2}$  mm. lata apice acuta vel obtusa basi erecta apice exteriore reflexa margine interiore recurva glabra. Glandulæ vel squamæ 5 inter lamellas basi

calycis tubi sitas dispositæ cum staminibus oppositæ lineares dorso complanatæ planæ  $1\frac{3}{4}$  mm. longæ  $\frac{1}{5}$  mm. latæ apice truncatæ. Stamina 5 basi tubi calycis inserta 4 mm. longa, filamentis basi connatis  $2\frac{1}{2}$  mm. longis dorso complanatis basi triangulari-dilatatis basi  $\frac{2}{3}$  mm. latis, glabris, antheris basifixis

ovato-lanceolatis  $2\frac{1}{2}$  mm. longis minus 1 mm. latis apice acuminatis apiculatis basi latioribus cordatis. Rudimentum ovarii filamentis firme involueratum cylindricum 2 mm. longum  $\frac{1}{2}$  mm. latum plurisulcatum infra apicem  $\pm$  contractum. Fl. ♀: calyces petalæque ut floris masculini; glandulæ breviores quam iis floris masculini. Staminodia triangulari-linearia  $2\frac{1}{2}$  mm. longa basi triangulari-dilatata 1 mm. lata apice obscure antheriformia. Ovarium stipitatum oblongo-ovoideum stylis stipitibusque exceptis 5 mm. longum  $3\frac{1}{2}$  mm. latum glabrum 4-5-carpellare 1-loculare 4-5-placentiferum, placentis parietalibus, stylo brevissimo  $\frac{1}{2}$  mm. longo 4-5-lobo, lobis patento-reflexis dorso complanatis  $\frac{1}{2}$  mm. longis totiusque latis apice stigmate peltato rotundato ad centrum depresso terminatis, stipite  $1\frac{1}{2}$  mm. longo validissimo glabro tereti. Capsula pendula vel cernua stipitata longe pedunculata obovoidea 6 cm. longa  $4\frac{1}{2}$  cm. lata apice depressa in sectione verticali apice cordata basi obtusa rotundata extus nitida flava usque rubra 4-5-valvata, valvis coriaceis lineari-lanceolatis utrinque obtusis intus albescentibus. Semina  $\infty$  rotundata valde compressa  $\pm$  angulata exocarpio membranaceo semi-hyalino oblecta, testa tenuiter coriaceo-crustacea extus remote grosseque impresso-punctata intus muricato-elevata, muricibus prominentibus obtusis trabeculiformibus, funiculis elongatis linearibus circ. 1 cm. longis complanatis 1 mm. latis, arillis campanulato-cupuliformibus 2 mm. longis 4 mm. in diametro basin seminum amplexantibus membranaceis margine irregulariter denticulatis.

HAB. Formosa.

I have lost a label given by a collector and my note mentioning affinities and localities of this species. They should be given in the next volume.

## Cornaceæ.

### *Cornus* LINN.

**Cornus longipetiolata** HAYATA sp. nov. Arbor? Ramuli glabri sub-læves lenticellis minutis subalbis notati. Folia alterna approximativè sita longissime petiolata ovato-oblonga vel rhomboideo-oblonga 5-10 cm. longa  $3\frac{1}{2}$ -7 cm. lata apice breve acuminata vel cuspidato-acuta basi rotundata obtusa cuneato-acuta chartacea margine integra sed sub lente minute denticulata supra viridia haud nitida subtus glaucissima subalba, costis venis venulisque



tenuissime impressis subtus prominente distincteque elevatis, venis lateralibus primariis utroque latere costæ 5-7 angulo acuto vel obtuso a costa egressis, venulis transverse reticulatis, petiolis longissimis gracilibus 3-9 cm. longis laminam equantibus vel superantibus subtus dorso complanato-semiteretibus supra intus haud sulcatis planis basi vix dilatatis. Cymæ 8 cm. longæ 10 cm. latæ, floribus ignotis.

HAB. Tōyenchō: Shibutsuke, in montibus circ. 3000 ped. alt.; leg. I. TANAKA, Nov. 1913.

NEAR *Cornus controversa* HEMSL (= *Cornus macrophylla* MATSUM Ind. p. 446), but differs from it in having very much longer petioles and leaves with depressed veins and veinlets on the upper surface. I am a little too bold in treating this plant as a new with such an imperfect specimen. Still the very much longer petioles and impressed veins and veinlets on the upper surface of the leaves are so remarkable that it is quite sufficient to recognize the plant as distinct from other species.

## Caprifoliaceæ.

### *Viburnum* LINN.

***Viburnum arboricolum*** HAYATA sp. nov. Frutex 5 m. altus vel altior, in trunco arboris crescens vel terrestris. Rami cinerascens vel  $\pm$  fulvescentes lenticellis minutis notati longitudinaliter rugosi. Folia opposita oblonga lanceolata vel oblongo-lanceolata maxima 17 cm. longa 8 cm. lata apice breve cuspidata, cuspidibus 1 cm. longis 5 mm. latis ad summum obtusis, vel simpliciter obtusa coriacea glabra supra (in vivo) non nitida opaca viridia subtus pallidiora basi cuneato-acuta margine a medio sursum dentato-serrata, (serris ascendentibus a se 7 mm. remotis apice interiore recurvis latere superiore 2 mm. longis latere inferiore 13 mm. longis), deorsum usque ad basin integra, costis supra planis vel tenuiter elevatis subtus prominente elevatis, venis lateralibus primariis utroque latere costæ 7-8, mediis angulo 60° a costa egressis  $\pm$  arcuatis prope marginem evanescentibus, venis secundariis transversis transverse reticulatis, venis lateralibus supra tenuiter sed distincte impressis, subtus distincte elevatis, venulis supra non visis subtus distincte visis, petiolis 2 cm. longis. Cymæ terminales pyramidales in circumscriptione 15 cm. longæ

totiusque latæ, (pedunculis 5 cm. longis), verticillatim 2-superpositim ramosæ, ramis inferioribus rectangulare patentibus 7 cm. longis, ramis superioribus gradatim brevioribus, ramulis rectangulare patentibus stellato-pilosis, bracteis triangularibus lanceolatis 1 mm. longis stellato-pilosis apice obtusis. Flores campanulati 7 mm. longi 6 mm. lati. Calycis tubus basi cum pedicellis articulatus 2 mm. longus cylindricus 1 mm. latus glaber, limbo 1 mm. longo campanulato-patenti late 5-dentato, dentibus late triangularibus minus 1 mm. longis  $1\frac{1}{2}$  mm. latis apice aentis vel breve cuspidato-aentis. Corolla cylindrico-campanulata utraque glabra 5 mm. longa, tubo 3 mm. longo totiusque lato, lobis late cordato-rotundatis 2 mm. longis totiusque latis apice rotundatis basi cordatis, partibus cordatis imbricatis margine integris vel obscure crenulatis. Stamina 5 ad faucem corollæ tubi affixa. Stylus validus basi conicus apice clavatus 3-sulcatus. Drupa ellipsoidea 8 mm. longa  $4\frac{1}{2}$  mm. lata apice reliquis calycis lorum et styli coronata 1-sperma. Putamen semi-ellipsoideum, in sectione rotundatum 7-8 mm. longum 4 mm. latum, dorso acute 2-costatum latere acute angulatum facie profunde sulcatum vel excavatum.

HAB. Mt. Arisan: Funkiko, ad 6000 ped. alt.; in truncos arborum crescens, leg. B. HAYATA et S. SASAKI, Jan. 1912. fl.; Rinkiho, leg. T. DOR, 1912, fr.

Near *V. odoratissimum* KER., but easily distinguishable by the deeper green lusterless leaves.

**Viburnum melanophyllum** HAYATA, sp. nov. Rami oppositi purpureo-fusco-cinerascentes, cortice longitudinaliter rugoso. Folia ut videntur decidua late ovata 5 cm. longa 3 cm. lata apice breve acuminata basi rotundata in exsiccato nigricantia supra ad costam et venas stellato-tomentosa, subtus ad costas venas venulasque dense stellato-tomentosa membranacea margine serrulata, serrulis minutis 1 mm. longis totiusque latis apice aristato-aentis a se 1 mm. remotis, venis primariis lateralibus utroque latere costæ 9-10, mediis angulo  $40^\circ$  a costa egressis subrectis sursum ramosis, ramis rectis ad apicem serrularum attingentibus, supra tenuiter impressis, subtus costis venisque prominentibus, venis secundariis transversis minute transverse reticulatis elevatis, petiolis 15 cm. longis. Cymæ terminales a basi ramosæ vel cæspitosæ dense tomentosæ, basi cataphyllis 3-4 lanceolatis crassiusculis 2 mm. latis 1 cm. longis

obtusis instructæ, 3 cm. longæ totiusque latæ ramosæ, bracteis lanceolatis dense stellato-tomentosis 5 mm. longis  $1\frac{1}{2}$  mm. latis. Fl. steriles marginales: corolla rotato-patens irregularis 5-lobata, lobis inæqualibus majoribus rotundatis 4 mm. in diametro. Fl. fertiles: calycis tubus suburceolatus vel truncato-obconicus subglaber 1 mm. longus  $\frac{2}{3}$  mm. latus, limbo 5-partito, partibus linearibus 1 mm. longis obtusis dense tomentosis. Corolla 5-lobata, lobis rotundato-oblongis. Stamina 5. Stylus ovoideo-coriaceus, stigmate 3-lobato.

HAB. Mt. Takasan, 6000 ped. alt., leg. N. KONISHI, 1909, mart.

Near *V. furcatum* BLUME.

**Viburnum propinquum** HEMSLE. Ind. Fl. Sin I. p. 355. Rami teretes oppositi fusco-rubrescentes lenticellis rotundatis notati. Folia opposita ovata ovato-oblonga 9 cm. longa  $4\frac{1}{2}$  cm. lata apice acuta vel triangulari-acuta basi late acuta vel obtuso-acuta coriacea vel coriaceo-chartacea utraque glabra margine remote serrulata, serrulis brevissimis ad mucronem reductis  $\frac{1}{2}$  mm. longis a se 9 mm. remotis, prope basin integra trinervia, nervis lateralibus a basi folii 5 mm. remotis arcuatis, nervis supra impressis subtus prominentibus, venis primariis lateralibus transversis venulis reticulatis supra impressis subtus tenuiter distinctis, petiolis  $1\frac{1}{2}$  cm. longis intus sulcatis glabris. Cymæ terminales 6 cm. longæ  $4\frac{1}{2}$  cm. latæ umbellatim ramosæ, pedunculis 2 cm. longis, bracteis ovatis minutis caducissimis, pulvinis sub bractea elevatis, ramis primariis (radiis umbellarum) 7, 2 cm. longis, ramis secundariis 5-6, 8 mm. longis, ramis tertianis (pedicellis) 3-4, 2-4 mm. longis breve hirsutis. Flores rotato-patentes 4 mm. in diametro 3 mm. longi. Calycis tubus 1 mm. longus, limbo campanulato-patenti circ. 1 mm. longo 5-lobato, lobis triangularibus apice obtusis  $\frac{1}{2}$  mm. longis 1 mm. latis. Corolla campanulato-rotata, tubo 1 mm. longo 5-lobato intus hirsuto et glanduloso-piloso, pilis clavatis glandulosis brevissimis, lobis oblongis  $1\frac{1}{2}$  mm. longis apice rotundatis basi haud contractis extus glabris intus prope basin hirsutis margine integris exteriore  $\pm$  recurvis. Stamina 5 ad basin tubi corollæ affixa, filamentis  $1\frac{1}{2}$  mm. longis linearibus apice filiformibus, antheris ellipticis dorsifixis. Ovarium inferius, stylo conico 3-sulcato.

HAB. Mt. Nantan, leg. U. MORI, 1910, Aprili. (fl.).

## Ericaceæ.

*Rhododendron* LINN.

**Rhododendron** (*Choniastrum*) **Tanakai** HAYATA sp. nov. Frutex 3 m. altus, in saxa  $\pm$  subscandens. Ramuli graciles teretes, cortice rubro-cinerascenti longitudinaliter fisso et soluto, cicatricibus cataphyllarum transverse linearibus 3 mm. latis  $\frac{1}{16}$  mm. longis remote notati, ad ramificationem cicatricibus semirotundatis foliorum verticillatim notati, usque ad ramificationem recti vel  $\pm$  recurvi sub-dichotome ramosi sursum 3 mm. in diametro. Folia ad summum ramulorum verticillatim sita coriacea supra atro-viridia impressa reticulata subtus pallida ovato-oblonga 10–15 cm. longa  $4\frac{1}{2}$ –5 cm. lata apice acuto-acuminata ad summum obtusiuscula basi rotundata ad extremitatem subito breveque attenuata ad petiolum abeuntia basi  $\pm$  obliqua vel interdum acuto-acuminata margine integra subplana  $\pm$  tenuiter desuper recurva utraque pagine haud nitida, costis venis venulisque supra impressis, costis subtus prominente elevatis validiusculis basi 2 mm. latis, venis lateralibus utroque latere costæ 10–12 gracillimis subtus tenuissime elevatis rectis angulo  $70^\circ$  a costa egressis prope marginem reticulatim ramosis et evanescentibus, venulis tenuissimis tenuissime elevatis distincte visis, utraque pagine glabra, petiolis 2 cm. longis semi-teretibus supra planis medio tenuiter sulcatis subtus convexis apice  $\pm$  subalatis vel haud alatis basi vix dilatatis in exsiccato fusco-nigricantibus. Gemmæ florum ad apicem ramulorum circa gemmam foliorum verticillatim 3–4–5 sitæ, 1-floratæ elongato-oblongæ vel oblongo-fusiformes 4 cm. longæ 14 mm. latæ utraque extremitate obtusæ, perulis  $\infty$  scariosis, basilaribus extimis minutis triangulari-ovatis 4 mm. longis totiusque latis apice obtusis basi  $\pm$  contractis ad insertionem  $\cap$ -formibus, inferioribus interioribus gradatim longioribus, interioribus superioribus longissimis obovato-spathulatis 3 cm. longis 13 mm. latis apice late triangularibus obtusis basi longe attenuatis margine integris interiore recurvis sursum intus plus extus minus sericeo-pubescentibus deorsum glabris, perulis intimis spathulato-linearibus longissimis 33 mm. longis apice 5 mm. latis deorsum gradatim angustioribus ad basin 1 mm. latam reductis margine ciliatis extus glabris intus tenuiter pubescentibus apice rotundatis margine interiore recurvis post anthesin caducissimis.



Flores apertientes campanulato-infundibuliformes 5 cm. longi albi vel leviter albo-purpurascens, pedicellis brevioribus glabris 5 mm. longis teretibus, viridibus. Calyx viridis 5-lobatus, lobis patentibus late triangulari-semi-rotundatis, ~-formiter recurvis, i. e. basi deorsum apice sursum recurvis,  $\frac{1}{2}$  mm. longis  $1\frac{1}{3}$  mm. latis apice late rotundatis margine pectinato-ciliolatis, ciliolis glandulosis, utraque facie glabris. Corolla campanulato-infundibuliformis 5 cm. longa 6 cm. lata, tubo 18 mm. longo basi 4 mm. lato apice usque ad 11 mm. latum dilatato, limbo 5-partito-lobato prope basin lobi superi maculato-punctato, maculis flavescentibus, lobis obovato-oblongis 33 mm. longis 25 mm. latis apice rotundatis vel ad centrum tenuiter retusis vel haud retusis margine crenulatis  $\pm$  undulatis multinervis longitudinaliter reticulato-venulosis, utraque pagine glabra sed prope basin corollæ tubi interiore tenuissime hirsuta. Stamina 10 in longitudine variabilissima, longissimum 4 cm. longum brevissimum 28 mm. longum, filamentis filiformibus complanatis usque 1 mm. latis sursum minus latis supra basin usque ad infra medium hirsutis cæterum glabris, antheris versatilibus dorsifixis obovato-rectangularibus 3 mm. longis 2 mm. latis apice truncatis brevis 2-lobatis 2-porosis (poris  $\pm$  oblique terminalibus circ. 1 mm. in diametro) basi retusis, loculis apice truncatis basi obtusis tenuiter brevissime 2-lobulatis, connectivis apice haud productis basi brevissime productis ad summum extremitatem retusis. Ovarium viride cylindricum  $\pm$  declinatum 9 mm. longum basi 3 mm. latum apice 2 mm. latum apice truncatum basi haud contractum 5-lobatum 5-sulcatum, stylo declinato ~-formiter recurvo  $3\frac{1}{2}$ -4 cm. longo glabro circ. 1 mm. in diametro sectionis apice vix dilatatis infra stigma 3 mm. in diametro. Stigma viride 5-partitum in partem apicalem styli cupuliformem insitum, partibus cuneiformibus  $1\frac{1}{3}$  mm. longis apice truncatis. Disci annuliformes sub ovario siti margine remote denticulati, denticulis  $\frac{1}{3}$  mm. longis rectangularibus apice truncatis a se  $\frac{1}{2}$  mm. remotis, sinibus inter denticulos rotundatis. Capsula ignota.

HAB. Mt. Arisan: inter Karapin et Suisharyō, ad 3000 ped. alt., leg. B. HAYATA et I. TANAKA, 1913, Aprili. (fl.).

Near *R. ellipticum* MAXIM. and *R. leiopodium* HAYATA, but separable from them by the larger darker green leaves, nearly white flowers, very much shorter pedicels, and especially by the pectinately ciliate calyx-lobes. The

plant seems to be rather rare. We could find the tree only once in the Arisan ranges, during our journey through the mountains. It is a dwarf shrub nearly 2-3 m. high, sending the branches downwards along the rocks where it stands.

*Moneses* SALISB.

**Moneses rhombifolia** A. ANDRES Piroleen-Studien, in Verh. Bot. Ver. Prov. Brand. LVI. (1914), pp. 23 et 69.

*Chimaphila rhombifolia* HAYATA Ic. Pl. Formos. II. (1912) p. 119, t. XVI.

Diapensiaceæ.

*Shortia* TORR. et GR.

**Shortia ritoensis** HAYATA sp. nov. *Shortiopsis ritoensis* HAYATA in Sched. Herb. Mus. Taihoku. Rhizoma erectum validiusculum. Folia omnia radicalia coriacea longe petiolata, lamina ovato-oblonga vel oblonga  $\pm$  rectangulariformi 18 mm. longa 13 mm. lata apice obtusissima ad centrum mucronata basi fere truncata ad basin subito ad petiolum attenuata utraque glaberrima concolora margine partibus prope apicem basinque exceptis serrata, serris utroque latere margine 6-7 a se 2 mm. remotis transverse ascendentibus late triangularibus apice ascendentibus  $1\frac{1}{2}$ -2 mm. latis  $\frac{1}{2}$ -1 mm. longis obtusis ad summum mucronibus brevissimis coronatis, margine crasso-marginata basi apiceque subintegra, costis venisque supra tenuiter elevatis subtus costis prominente elevatis venis planis, venis lateralibus utroque latere costæ 4 subrectis apice obscuris ad apicem serrarum obscure attingentibus a costa angulo 60°-70° egressis, venulis non distinctis sub luce transversa visis reticulatis, petiolis gracilibus cum laminis foliorum desuper arcuatis ad terram attingentibus 23-25 mm. longis subalatis supra profunde sulcatis subtus costatis basi  $\pm$  dilatatis. Scapi cum foliis æquilongi erecti terminales, basi bracteis basilaribus (vel cataphyllis) 3-4-verticillatis instructi, bracteis basilaribus lanceolatis 8 mm. longis 2 mm. latis concavis margine interiore recurvo-revolutis apice acuminatis multinervis, a supra basin usque ad prope apicem nudi, prope apicem sub flore 1-2-bracteis superioribus instructi, bracteis superioribus ovato-lanceolatis acuminatis 5 mm. longis valde concavis margine interiore revolutis. Flores ad apicem scapi solitarii; calycis lobi 5, 3-exteriore ovati



5½ mm. longi 3½ mm. lati apice acuti ad summum submucronati basi haud vel vix contracti, 2-interiores elliptici 5 mm. longi 2½ mm. lati apice rotundati vel obtusissimi ad summum retusi vel brevissime 2-lobati ad centrum sinus brevissime mucronati basi contracti rotundati 1 mm. lati margine prope apicem minute denticulati cæterum integri intus plani extus medio tenuiter costati (costis basi triangulari-dilatatis), multinervi. Corolla (alba?) campanulata 7 mm. longa 5-lobata extus intusque glabra, tubo 1½ mm. longo, lobis cuneato-obovatis 6 mm. longis 4 mm. latis apice rotundatis basi late cuneatis sed vix angustatis apice 3-5-lobato-dentatis, dentibus triangularibus 1 mm. latis totiusque longis apice obtusis vel acutis interdum obtusissimis latere margine integris basi vix contractis pinnivenis, venis latelaribus utroque latere 2-3, venis ad apicem dentium attingentibus, sinibus inter lobos obtusissimis. Stamina 5 cum lobis corollæ alterna, filamentis validiusculis basi ad tubum corollæ usque ad sinus inter lobos corollæ adnatis, partibus liberis  $\frac{1}{3}$  mm. longis  $\frac{1}{2}$  mm. latis valde complanatis ad basin utroque latere appendiculatis, appendiculis mucroniformibus  $\frac{1}{10}$  mm. longis, antheris cordatis 1½ mm. longis 1½ mm. latis apice emarginatis basi cordatim bilobatis intus  $\infty$ -formibus extus  $\infty$ -formibus dorsifixis, apicibus filamentorum vel connectivis dorsolterioribus. Ovarium late globosum 1¼ mm. longum 1½ mm. latum apice plano-depressum tenuiter 3-lobatum vel obscure vel haud lobatum glabrum, stylo columniformi tereti 2½ mm. longo apice truncato tenuiter 3-lobato. Capsula ovato-globosa 3 mm. longa loculicide deliscens, valvis a placenta solutis, stylo non partito. Semina  $\infty$  rubra scobiformia ellipsoidea angulata  $\frac{2}{3}$  mm. longa, testa elegante reticulata. Staminodia nulla.

HAB. Mt. Ritōzan, by T. KAWAKAMI, Juli. 1913.

Resembles *Shortiopsis*\* *exappendiculata* HAYATA (= *Shortia exappendiculata* HAYATA Ic. Pl. Formos. III. p. 147) in having nearly sessile anthers, not divided styles of the capsules and in the absence of the staminodes; but differs from it by the far much smaller leaves with different dentation, by the smaller flowers, very short broader complanate filaments with appendices on both sides and by the differently shaped anthers.

## Orobancheæ.

*Boschniakia* C. A. MEY.

**Boschniakia Kawakamii** HAYATA sp. nov. Parasitus ad radices *Rhododendronis* sp. Volva ignota. Caulis 13–35 cm. longus teres  $1\frac{1}{2}$ –2 cm. in diametro glaber basi squamis late triangularibus dense imbricatis obtektus, squamis sursum gradatim longioribus remotioribus in racemo ad bracteas abeuntibus, squamis superioribus infra partem floriferam caulis triangulari-lanceolatis 18 mm. longis 8 mm. latis coriaceis in exsiccato valde fragilibus concavis apice obtusis vel obtusissimis basi haud contractis  $\pm$  dilatatis decurrentibus utraque facie glabris a se  $1$ – $1\frac{1}{2}$  cm. remotis. Racemi floriferi ignoti. Racemi (partes caulium fructiferorum) 8–16 cm. longi cylindrici cum fructibus  $3$ – $3\frac{1}{2}$  cm. lati, bracteis elongato-obovatis oblongo-obovatis 2 cm. longis circ. 1 cm. latis apice triangulari-obtusis basi vix angustioribus  $\pm$  cuneato-angustatis vel haud angustioribus ad basin 6 mm. latis  $\pm$  decurrentibus, bracteolis nullis, pedicellis 3–2 mm. longis 2 mm. latis subcomplanatis apice gradatim dilatatis ad calycem abeuntibus glabris. Calyx fructifer: tubi subnulli vel brevissimi, limbo subpatenti cum receptaculo 8 mm. in diametro 4 mm. in radio margine integro vel irregulariter 3–5 lobato, lobo postico longiore late obovato-oblongo 3 mm. longo totiusque lato apice truncato-obtusos basi vix angustiore, lobis lateralibus sub-oblongis cum lobis anterioribus 2 connatis, margine in totum tolis minute denticulatis minute remote brevissimeque glanduloso-ciliolatis. Capsula ovoidea  $\pm$  obliqua anteriore basi plus convexa posteriore minus convexa, inferior major 2 cm. longa 14 mm. lata apice triangulari-pyramidalis acuto-obtusa basi obtuso-rotundata sursum 3-gona 3-valvata, valvis ovato-triangularibus apice triangularibus ab apice usque ad medium solutis apice brevissime 2-fidis glabris. Semina complanata multi-angulariformia 1 mm. in diametro  $\frac{1}{3}$  mm. crassa radialiter reticulata, reticulis valde profundis alvum simulantibus.

HAB. Mt. Morrison, ad 10000 ped. alt., leg. T. KAWAKAMI et S. SASAKI, Oct. 1909.

Very near *Boschniakia himalaica* Hk. f. et Th., but differs from it by the very short fruit-bearing pedicels attaining 2 mm. in length, (in Himalayan

species it is  $\frac{1}{2}$  in. long), and by the irregularly lobate and minutely glandularly ciliolate calyx-limb. Capsule in this species is always regularly 3-valved, while in Himalayan species it is irregularly 2-3 valved.

## Laurineæ.

### *Beilschmiedia* NEES.

***Beilschmiedia erithrophloia* HAYATA sp. nov.** Arbor, truncus erectus et rectus, cortice rubescenti variegato. Rami recti subternatim ramosi longitudinaliter rugulosi cicatricibus minutis elevatis notati. Folia tenuiter coriacea, in exsiccato costis et venis subrubrescentibus, in vivo viridia supra nitida oblonga ovato-oblonga vel ovato-lanceolata 9 cm. longa  $4\frac{1}{2}$  cm. lata apice acuminata sed ad summum obtusissima vel simpliciter obtusa basi cuneato-acuta obtusa ad petiolum attenuata plus minus obliqua, costis rubescentibus supra subplanis vel tenuiter sulcatis subtus tenuiter elevatis, venis et venulisque utraque pagine distincte elevatis eleganter reticulatis, reticulis subtus plus distinctis, utraque pagine glaberrima margine integerrima sed  $\pm$  repando-undulata, venis primariis utroque latere costæ 5-6 arcuatis, petiolis  $1\frac{1}{2}$ -2 cm. longis semiteretibus  $\pm$  complanatis sursum intus planis deorsum sulcatis. Flores ignoti. Bacca obovoidea 2 cm. longa 12 mm. lata apice rotundata basi obtusa nigra nitida uni-sperma, pedicello laud incrassato.

HAB. Mt. Arisan, (3000 ped. usque ad 7000 ped. alt.), leg. R. KANEHIRA, I. TANAKA et B. HAYATA, Aprili, 1914.

One of the specimens of this species in my previous collections was brought to Kew by Mr. W. R. PRICE for comparison, and it was sent back to me with the following note. "Mr. GAMBLE identifies this as a species of *Beilschmiedia* NEES., but can not match. The venation and shape of buds separate it from *Cinnamomum*.—W. R. P. The tree is very common in the Arisan ranges. I found the tree bearing fruit in January, 1912, and also in April, 1914; but I could never see the flowers.

### *Cinnamomum* BLUME.

***Cinnamomum pseudo-Loureirii* HAYATA sp. nov.** Fructus pisiformis ellipsoideus 1 cm. longus 6 mm. latus, tubo calycis auctato late campanulato 3 mm. longo  $4\frac{1}{2}$  mm. lato, pedicellis 6 mm. longis.

HAB. Tōyen : Taiyakau, lég. I. TANAKA et S. NAKAI, Oct. 1912, fr.

Very near *Cinnamomum Loureirii* NEES., but differs from it by the quite entire calyx. Full description should be given in the next volume.

## Cupuliferæ.

### *Quercus* LINN.

***Quercus kodaihoensis*** HAYATA sp. nov. (Tab. IV.) (*Pasania kodaihoensis* HAYATA) Arbor. Rami fusco-cinerascentes lenticellis minutis rotundatis parce notati, ramulis et petiolis fusco-pubescentibus sulcato-angulatis. Folia oblonga obovata vel oblongo-ovata in magnitudine variabilissima, minora 8 cm. longa 3 cm. lata, maxima 14 cm. longa 6 cm. lata, apice cuspidato-acuminata basi cuneata vel obtusa margine sursum serrata, (serris ascendentibus a se 1-1½ cm. remotis latere superiore 2 mm. longis latere inferiore 1-1½ cm. longis), chartacea vel tenuiter coriacea supra (in exsiccatō) viridia subtus plus minus pallida, costa supra impressa subtus elevata, venis primariis lateralibus supra impressis subtus elevatis utroque costæ latere 8-9 mediis angulo 50 a costa egressis subtus distincte elevatis, petiolis 1-3 cm. longis, intus tenuiter sulcatis basi valde tumidis. Cupula turbinata 1½ cm. longa 3 cm. in diametro basi rotundata ore leviter contracta 17 mm. in diametro, extus lepidibus triangularibus cuspidatis dense imbricatis adnatis obtecta, (lepidibus inferioribus longe triangularibus 1 mm. longis 4 mm. latis apice cuspidatis, superioribus late triangularibus apice cuspidatis multo minoribus), intus cicatricibus glandum perfecte occupata partibus ultra cicatricem 3 mm. altis. Glans semi-globosa 2 cm. longa 28 mm. in diametro basi cupula complete involucrata (cicatrice convexa rotundata), apice subtruncata leviter convexa vel subplana exposita tenuiter sericeo-villosa ad centrum mucronato-apiculata.

HAB. Kagi : Kodaiho, Sankyakunanzan, lég. S. NAKAI, Nov. 1912.

Near *Q. Konishii*, but differs from it by the much deeper cups, and by the truncated semi-globose glans. Also near *Quercus Cornei* in the shape of the cones, but differs in having far much smaller leaves.

***Quercus stenophylloides*** HAYATA sp. nov. Arbor. Rami cinerei longitudinaliter rugulosi, cicatricibus minutis remote notati. Folia coriacea ovato-oblonga vel ovato-lanceolata 9 cm. longa 3 cm. lata apice acuminata

rotundata obtusa vel acuta margine basi apiceque integra cæterum aristato-dentata, (dentibus 1 cm. a se remotis late brevissime triangularibus latere inferiore 1 cm. longis latere superiore  $1\frac{1}{2}$  mm. longis ascendentibus sursum  $\pm$  recurvis aristatis, aristis 1 mm. longis obtusis  $\pm$  superiore recurvis), supra nitida in exsiccato subrubescencia vel subviridescencia subtus glaucissima, costis venisque supra tenuiter sulcatis vel planis, subtus costis prominente elevatis venis tenuiter sed distincte elevatis gracillimis, venis primariis lateralibus utroque latere costæ 10–11 subrectis, mediis a costa angulo  $45^\circ$  egressis prope marginem subarcuatis ad apicem dentium attingentibus, venulis supra minute reticulatis subtus haud vel vix visis, petiolis  $1\frac{1}{2}$  cm. longis gracillimis semitere-tibus intus subplanis vel late sulcatis. Cupula præmatura obconica 8 mm. longa 11 mm. lata ore vix vel haud contracta sessilis extus villosa, lepidibus (bracteis) connatis spiraliter 5-annulatis, annulis a se 2 mm. remotis margine denticulatis, denticulis truncatis dense villosis. Glans conico-globosa matura non visa.

HAB. Mt. Arisan, leg. K. UYEMATSU, 1912, Sept.

Near *Quercus stenophylla* MK.; but differs from it in having thicker leaves with different dentation.

## Coniferæ.

### *Cephalotaxus* ZUCC.

**Cephalotaxus Wilsoniana** HAYATA sp. nov. Arbor, ramulis rectis subglabris. Folia disticha spiraliter disposita linearia 4 cm. longa 3 mm. lata apice gradatim acuta basi obtuso-contracta supra in exsiccato costa distincte prominenteque elevata subtus minus distincte elevato-plana, margine tenuissime desuper recurva, subtus inter marginem et costam glaucissima. Drupa ellipsoidea vel obovato-ellipsoidea 18 mm. longa 10 mm. lata apice acuta breve apiculata basi obtusa subsessilis.

*Cephalotaxus* sp. HAYATA Fl. Mont. Formos. p. 215.

HAB. Mt. Arisan, leg. K. UYEMATSU, (No. 18) typus; Ganzan, leg. NAGASAWA, (No. 568).

Very near *Cephalotaxus drupacea* S. et Z., differing from it only by leaves with less acute (or nearly obtuse) apex and narrower base.



## Hydrocharideæ.

*Hydrocharis* LINN.**Hydrocharis asiatica** MIQ.

HAB. Kōshūn (Herb. Taihoku).

## Orchideæ.

*Oberonia* LINDL.

**Oberonia arisanensis** HAYATA sp. nov. (Fig. 3, a-e, and h.) Epiphyta pendula. Caulis cum spicis 15 cm. longus cæspitosus, partibus foliatis inferioribus 6 cm. longis dense approximativè foliatis, partibus floriferis pendulis filiformibus 7 cm. longis, parti-

bus inter eam floriferam et eam foliatam 2-3 cm. longis squamiferis, squamis lanceolatis acuminatis 2 mm. longis. Folia alterna disticha approximata in exsiccato coriacea in vivo crassiuscula imbricata semi-oblonga equitantia latere compressa plana  $1\frac{1}{2}$ -2 cm.

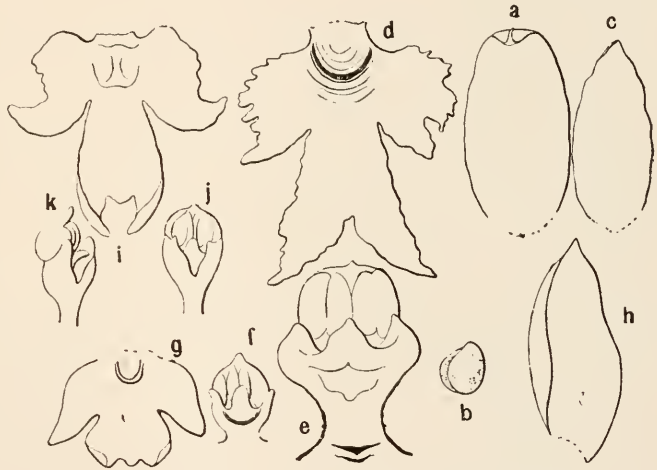


FIG. 3, a, b, c, d, e, h, *Oberonia arisanensis* HAYATA; a, a dorsal sepal; h, a lateral sepal; c, a petal; d, a lip; e, a column; b, a pollinium; f, g, *Oberonia formosana* HAYATA; g, a lip; f, a column, seen from front; i-k, *Oberonia kusukusensis* HAYATA; i, a lip; j, a column, seen from front; k, the same, seen from side.

longa 5 mm. lata apice obtusa vel ad summum apiculata basi ad vaginam abeuntia laud articulata, margine inferiore recta, margine superiore ~formiter recurva, vaginis se imbricatis. Spicæ 7 cm. longæ, rhachibus filiformibus, floribus verticillatim aggregatimque ad nodos sitis, nodiis a se 1-2 mm. remotis, bracteis ovato-lanceolatis  $1\frac{1}{2}$  mm. longis  $\frac{2}{3}$  mm. latis apice acuminatis margine obscure erosis, pedicellis cum ovariis 1 mm. longis. Sepalum posticum oblongum 1 mm. longum  $\frac{2}{3}$  mm. latum sursum concavum versus



apicem interiore recurvum breve cuspidatum, partibus cuspidatis interiore incurvis, margine integrum; sepala lateralia ovato-triangularia basi latissima 1 mm. longa  $\frac{3}{4}$  mm. lata apice acuta basi haud contracta concava. Petala oblonga 1 mm. longa  $\frac{1}{2}$  mm. lata apice obtusa basi haud contracta margine erosa. Labellum rubesens, ancoraeforme  $1\frac{1}{3}$  mm. longum totiusque latum alte trilobum, lobis basilaribus (lateralibus) oblongis  $\frac{1}{2}$  mm. longis apice obtusissimis basi vix contractis margine eroso-fimbriatis vel erosis, lobo terminali rectangulari 1 mm. longo  $\frac{1}{2}$  mm. lato apice 2-lobo, lobis oblongo-triangularibus  $\frac{1}{3}$  mm. longis totiusque latis apice acutis, sinibus inter lobos truncatis interdum lobulo singulo brevissimo ad centrum instructis. Labellum basi  $\pm$  saccatim impressum. Columna brevissima

HAB. Arisan: inter Taroyen et Funkiko, circ. 6000 ped. alt., leg. B. HAYATA et T. ITÔ, Mart. 1914, (fl.).

Near *O. kusukusensis* HAYATA, but differs from it by the very short columns and much larger lips. Also near *O. formosana* HAYATA, but easily distinguishable by the larger leaves.

**Oberonia bilobatolabella** HAYATA sp. nov. (Fig. 4.) Epiphyta caespitosa pendula. Caulis cum racemis 15 cm. longus, partibus inferioribus foliosis 6-7 cm. longis, partibus floriferis 8 cm. longis filiformibus, partibus

caulis inter foliatam et floriferam 2-3 cm. longis subnudis vel paucissime squamatis, squamis 1-2 lanceolatis 1 cm. longis subequitantibus. Folia equitantia latere compressa complanata crassiuscula semi-oblongo-linearia circ. 3 cm. longa 3 mm. lata apice obtuso-acuta basi non contracta cum vaginis articulata margine superiore recta margine inferiore  $\cup$ -formiter recurva in exsiccato coriacea, vaginis

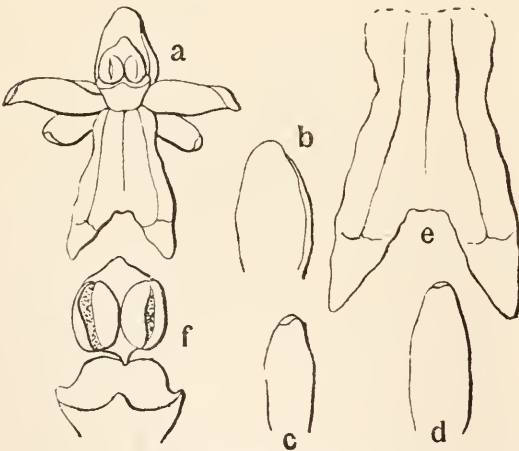


Fig. 4, *Oberonia bilobatolabella* HAYATA; a, a flower; b, a dorsal sepal; c, a lateral sepal; d, a petal; e, a lip; f, a column, anther being a little lifted.

tennibus rhomboideis alternis imbricatis circ. 1 cm. longis. Racemi 5-8 cm. longi 8 mm. lati penduli, rhachibus pentagonis ☆-formibus filiformibus tenuibus, floribus ad nodos subverticillatim aggregatim sitis, nodis a se circ. 5 mm. remotis, bracteis singulis sub flore nno sitis ovato-triangularibus  $1\frac{3}{8}$  mm. longis circ. 1 mm. latis apice obtusis basi haud vel vix contractis margine irregulariter eroso-denticulatis, pedicellis cum ovariis 2 mm. longis. Flores circ. 3 mm. longi, sepalis petalisque retrorsum reflexis, labello antice patenti. Sepalum posticum rotundato-ovatum minus 1 mm. longum  $\frac{2}{3}$  mm. latum, apice obtusum basi contractum, lateralia ovato-triangularia valde concava 1 mm. longa  $\frac{3}{4}$  mm. lata apice obtusa basi haud contracta. Petala lineari-oblonga plus 1 mm. longa minus  $\frac{1}{2}$  mm. plus  $\frac{1}{3}$  mm. lata apice obtusissima basi vix contracta. Labellum in circumscriptione rectangulare plus 2 mm. longum plus 1 mm. latum planum basi  $\frac{1}{2}$  mm. latum 2-nerviū basi utroque latere auriculis minutis  $\frac{1}{4}$  mm. latis semi-rotundatis instructum, supra medium 2-lobatum, lobis oblongo-triangularibus circ. 1 mm. longis plus  $\frac{1}{2}$  mm. latis apice acutis basi haud contractis, sinibus inter lobos truncatis  $\frac{1}{3}$  mm. latis. Columna brevissima  $\frac{1}{3}$  mm. longa  $\frac{1}{3}$  mm. lata.

HAB. Arisan, leg B. HAYATA et S. SASAKI, Jan. 1912.

Near *Oberonia arisanensis* HAYATA, but differs from it by the much larger flowers with nearly obsolete or, if at all, very much smaller lateral lobes of the lips and by the distinctly articulated leaves.

**Oberonia formosana** HAYATA (Fig. 3, f, g), Mater. Fl. Formos. p. 309. Epiphyta caespitosa, caulibus simplicibus vel rarius panicramosis 3-5 cm. longis toto longitudine foliatis. Folia disticha sessilia alterna approximata equitancia verticaliter compressa lineari-lanceolata 22 mm. longa  $2\frac{1}{2}$  mm. lata apice aristato-acuta margine integra basi latere inferiore recta superiore ∪-formiter curva vaginosa caulem amplectantia crassiuscula. Spicae terminales cum pedunculis 8 cm. longae cernuæ, floribus minutis 1 mm. in diametro, secus rachin interrupte fasciculatim dense sitis, bracteis ovato-acuminatis 1 mm. longis reflexo-patentibus. Sepala lateralia late ovata basi connata  $\frac{1}{2}$  mm. longa totiusque lata obtuso-acuta patentissima, posticum minus. Petala sepalo angustiora oblonga  $\frac{2}{3}$  mm. longa  $\frac{1}{3}$  mm. lata obtusa. Labellum sessile concavum rotundatum in circumscriptione  $\frac{2}{3}$  mm. longum totiusque

latum 3-lobatum, lobo medio majore apice tenuiter 3-lobulato obtuso, lobis lateralibus acutis brevioribus, basi minute callosum, callis rubris. Columna brevissima  $\frac{1}{3}$  mm. longa.

HAB. Nantō: Randaizan. leg. T. KAWAKAMI et U. MORI, Juni. 1907, (No. 3474).

Somewhat near *O. japonica* MAXIM., but differs from it in having long lanceolate leaves which are as three times long as those of the Japanese plant; still nearer *O. Clarkei* in its habit and leaves, but differs from it by the lips with acute entire side-lobes which in *O. Clarkei* are fimbriate.

**Oberonia kusukusensis** HAYATA sp. nov. (Fig. 3, i-k.) Epiphyta, caespitosa pendula. Caulis cum spicis 10-15 cm. longus, partibus inferioribus foliatis 3 cm. longis, partibus floriferis circ. 10 cm. longis pendulis filiformibus, partibus caulis inter floriferam et foliatam minute squamiferis circ. 2 cm. longis, toto glaber. Folia non articulata approximata disticha alterna basi se imbricata lineari-semilanceolata media 2-3 cm. longa 5 cm. lata apice acuta vel subobtusa breve apiculata basi caulem amplectantia in exsiccato membranacea in vivo crassiuscula equitantia a latere compressa complanata a caule angulo 30°-50° egressa margine inferiore recta margine superiore  $\cap$ -formiter recurva, vaginis cum lamina continuis. Spicae 10 cm. longae filiformes, floribus ad nodos subverticillatim aggregatimque sitis, bracteis singulis sub flore uno sitis, nodis a se 2 mm. remotis bracteis triangulari-lanceolatis  $1\frac{1}{2}$  mm. longis  $\frac{1}{2}$  mm. latis apice acuminatis, pedicellis  $\frac{1}{2}$  mm. longis, ovariis  $\frac{1}{3}$  mm. longis. Flores apertientes  $1\frac{1}{2}$  mm. in diametro; sepalum posticum obovato-oblongum  $\frac{2}{3}$  mm. longum circ.  $\frac{1}{2}$  mm. latum apice obtusissimum basi  $\pm$  contractum margine obscure denticulatum vel integrum; sepala lateralia valde concava triangulari-oblonga  $\frac{2}{3}$  mm. longa basi latissima non contracta  $\frac{2}{3}$  mm. lata apice obtusa ad summum breve apiculata. Petala ovato-oblonga  $\frac{2}{3}$  mm. longa  $\frac{1}{2}$  mm. lata apice obtusissime vel truncate obtusa basi  $\pm$  cuneato-contracta margine obscure eroso-denticulata. Labellum 3-lobum, circ. 1 mm. longum  $\frac{2}{3}$  mm. latum basi contractum, lobis basilaribus (lateralibus) oblique oblongis a lobo centrali angulo 45° divaricatis semiovatis apice cuspidato-acuminatis  $1\frac{1}{2}$  mm. longis margine interiore rectis subintegris margine exteriori inferiore obscure eroso-denticulatis basi rotundatis  $\cap$ -formiter recurvis, lobo centrali (terminali)

oblongo-rectangulari  $\frac{1}{2}$ - $\frac{2}{3}$  mm. longo  $\frac{1}{3}$ - $\frac{1}{2}$  mm. lato sursum latiore basi  $\pm$  contracto apice truncato-2-lobo, lobis triangularibus  $\frac{1}{5}$  mm. longis acutis, sinibus inter lobos lobulo singulo rotundato minuto instructis. Labellum basi obscure disciferum basi medio subsaccato-impressum. Columna brevissima  $\frac{1}{3}$  mm. longa basi valde constricta.

HAB. Kujukusu, leg. B. HAYATA et S. SASAKI, Juni. 1912.

Near *O. arisanensis* HAYATA; but differs from it by the very much smaller flowers with linear bracts which nearly surpass the flowers in length.

*Liparis* RICH.

***Liparis dolichopoda*** HAYATA sp. nov. (Tab. V.) = *Cestichis dolichopoda* HAYATA. Rhizoma in arborem repens teres  $2\frac{1}{2}$  mm. in diametro vaginis obtectum vel subnudum. Caulis cum racemis 23 cm. longus teres basi bulboso-dilatatus basi 13 mm. in diametro basi vaginis obtectus vel subnudus, vaginis 5 cm. longis apice acutis partem bulbosam caulis amplexantibus. Folia basi racemi vel apice caulis 2-3-4 alternatim congesta, basi a caule articulatum soluta lanceolata 14 cm. longa 2 cm. lata apice obtusa basi plus minus angustata basi ad articulationem 7 mm. lata in exsiccatum membranacea, venis parallelis utraque pagina elevatis. Racemi circ. 10 cm. longi cylindracei 2 cm. lati, pedicellis (cum ovariis) 5 mm. longis horizontaliter patentibus, bracteis lanceolatis acuminatis erectis 3 mm. longis, floribus a se 3-4 mm. remotis. Flores albescentes vel albo-virides. Sepala subaequalia oblonga  $3\frac{1}{2}$  mm. longa  $1\frac{1}{2}$  mm. lata apice obtusa basi non contracta aequilata. Petala linearia  $3\frac{1}{2}$  mm. longa  $\frac{1}{2}$  mm. lata apice obtusa basi aequilata  $\frac{1}{2}$  mm. lata. Labellum plus minus crassum obovatum 3 mm. longum 2 mm. latum valde recurvum medio subito angustatum apice bilobum, sursum prope apicem minute hirtellatum. Disci basi labelli breve 4- lamellati. Columna 2 mm. longa. *Liparis longipes* SCHLECHT. (non LINDL.) MATSUM. et HAYATA Enum. Pl. Formos. p. 404.

HAB. Formosa: loco non indicato, cult. in seminario Taihoku, leg. B. HAYATA, Jan. 1912.

Near *L. longipes* LINDL. (Orchids of the Sikkim Himalayas, in Ann. Roy. Bot. Gard. Calc. Vol. VIII. t. 37), but separable from it by the lips which are in this new species two-lobed at the apex. This species is that



orchid which was sent to R. SCHLECHTER some years before and was sent back here by him with the name of *Liparis longipes* LINDL.

**Liparis Kawakamii** HAYATA sp. nov. (Fig. 5.) Caulis (cum racemis) 23 cm. longus basi squamatus, squamis vaginiformibus 3-5 cm. longis 15 mm. latis apice acutis vel acuminatis, basi supra partem squamatam 2-foliatus. Folia oblanceolata sessilia 13 mm. longa 2 cm. lata apice acuto-obtusa basi attenuata, nervis manifestis 5, in vivo crassiuscula, in exsiccato submembranacea. Racemi terminales 18 cm. longi, rhachibus complanatis alatis, alis 1 mm. latis, pedunculis 10 cm. longis squamiferis, squamis cum bractea

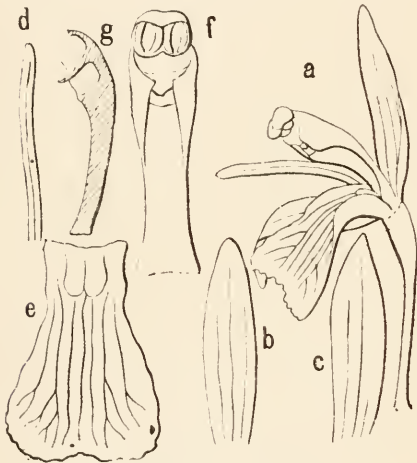


Fig. 5, *Liparis Kawakamii* HAYATA; a, a flower, one of the lateral sepals taken off; b, a dorsal sepal; c, a lateral sepal; d, a petal; e, a lip; f, a column; g, the same, in vertical section.

conformibus lanceolatis 8 mm. longis 1-2 mm. latis acuminatis a se 1 cm. remotis, partibus floriferis 5-6 cm. longis laxiuscule floratis, pedicellis 7 mm. longis gracilibus, ovariis 2 mm. longis  $\frac{2}{3}$  mm. latis, bracteis lanceolatis 8 mm. longis acuminatis. Sepalum posticum lineari-angustatum  $5\frac{1}{2}$  mm. longum  $1\frac{3}{4}$  mm. latum apice obtusum basi non contractum approximati 3-nervi, lateralia  $\pm$  obliqua postico vix breviora. Petala angustissime linearia 6 mm. longa  $\frac{1}{2}$  mm. lata apice obtusa 1-nervia basi non contracta. Labellum cuneiforme 5 mm.

longum apice  $3\frac{1}{3}$  mm. latum apice latissimum medio  $\pm$  contractum  $2\frac{2}{3}$  mm. latum basi contractum  $1\frac{1}{2}$  mm. latum apice truncatum denticulatum latere margine subintegrum latere infra medium sub erectum, basi medio discis collosis instructum. Columna recurva 4 mm. longa dorso complanata, utroque latere leviter alata, alis prope apicem columnæ  $\pm$  dilatatis.

HAB. Formosa: Loco non indicato; leg. T. KAWAKAMI.

Near *L. Uchiyamæ* SCHLECHT., but differs from it by the broader leaves and less prominent auricles at the apex of the column.

**Liparis macrantha** ROLFE, (Fig. 6) in Ann. Bot. IX. p. 156; MATSUM. et HAYATA Enum. Pl. Formos. p. 406.

HAB. Kelung, Heichōshō, Mt. Arisan.

The orchid is rather widely distributed in the island. The type I have never seen. As far as the original description is concerned, our specimens may be referred to ROLFE's species.

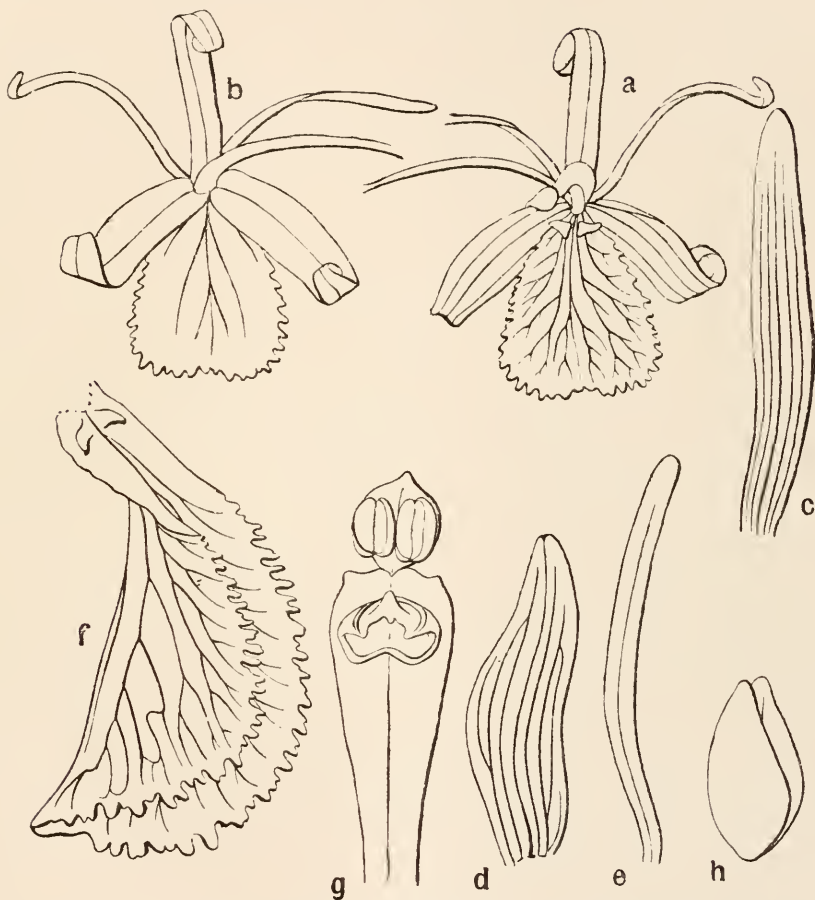


Fig. 6, *Liparis macrantha* ROLFE; a, a flower; b, the same, seen from back; c, a dorsal sepal; d, a lateral sepal; e, a petal; f, a lip; g, a column, anther lifted; h, a pollinium.

**Liparis Nakaharai** HAYATA (Fig. 7) Mater. Fl. Formos. p. 130. Caulis 2-foliatus inferne brevissime vaginatus, vaginis ovatis brevioribus superne gradatim elongatis. Folia 2 ad basin caulis sita oblanceolata cum petiolis 35 cm. longa 2 cm. lata racemum in longitudine æquantia apice



acuminata basi gradatim attenuata in petiolum 10 cm. longum abeuntia ima basi articulata multinervia utrinque glabra. Flores mediocres 2 cm. in diametro, in racemum laxefloratum 15 cm. longum terminalem pedunculatum dispositi, pedunculis 18 cm. longis gracilibus erectis, bracteis lanceolatis 1 cm. longis. Sepala libera patentia linearia 9 mm. longa 1 mm. lata apice obtusa, posticum postice reflexum recurvatum, lateralia antice paralleliter patentia inferne recurvata. Petala linearia 9 mm. longa  $\frac{1}{2}$  mm. lata postice et inferne reflexa. Labellum cuneiforme in circumscriptione 8 mm. longum,  $5\frac{1}{2}$  mm. latum a medio antice curvatum apice latissime truncatum irregulariter denticulatum basi columnae affixum, a medio basi erectum ima columnam

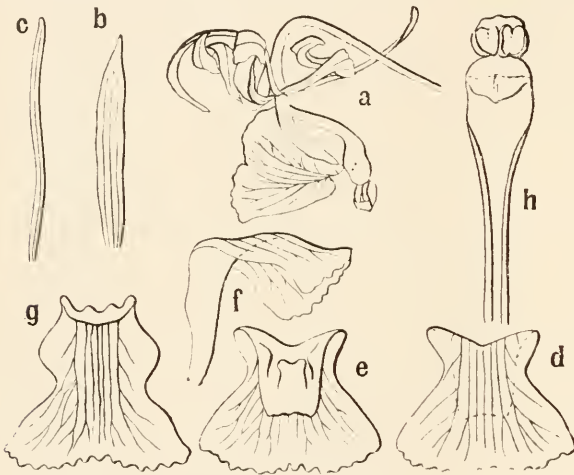


Fig. 7, *Liparis Nakaharai* HAYATA; a, a flower; b, a sepal; c, a petal; d, a lip; e, the same seen from back; f, the same, seen from side; g, the same seen from back; h, a column, anther lifted.

amplectans a medio superne patens elobatum basi 2-tuberculatum. Columna elongata 5 mm. longa semiteres.

HAB. Taitō, Manchōsha, leg. T. TAWAKAMI et G. NAKAHARA, Jan. 1906, (No. 766).

This is very distinct species; it is somewhat near *L. flaccida* in its habit, but very much different from it in having much larger lips, longer

pedicels and in many other points.

***Liparis platybolba* HAYATA** (Fig. 8) sp. nov. Epiphyta. Rhizoma in arborem repens complanato-teres 2 mm. latum, radices a basi pseudobulbi gerentes. Pseudobulbi valde complanati oblongi vel ovato-oblongi vel elliptici  $2\frac{1}{2}$  cm. longi 2 cm. lati 7 mm. crassi glabri basi reliquis squamarum obtekti apice 2-foliati, foliis cum petiolis articulatis, petiolis subnullis in utroque latera pseudobulbi valde decurrentibus, partibus decurrentibus 25 mm. longis tenuibus sursum 4 mm. latis deorsum angustissimis ad nullum reductis. Folia ob-

lanceolata 14 cm. longa 28 mm. lata apice triangulari-acuta basi gradatim angustata 8 mm. lata ad petiolum subnullum abeuntia secus medium tenuiter plicata exsiccatò membranacea vivo crassiuscula supra viridia ad costas tenuiter sulcata utroque latere costae 3-4 nervata, nervis et venis supra non visis, subtus pallidiora, costis elevatis, nervis tenuiter visis, margine integra circ. plana tenuissima. Scapi (racemi) ad apicem pseudobulbi terminales, 20-25 cm. longi complanati deorsum distincte alati cum alis 4 mm. lati a basi sursum usque ad  $3\frac{1}{2}$  cm. longum nudi, plus sursum usque ad partem floriferam squamati, squamis inferioribus longioribus laxiusculis lanceolatis  $2\frac{1}{2}$  cm. longis 4 mm. latis acuminatis remotiusculis, superioribus minoribus densiusculis ad bracteam abeuntibus. Pars florifera racemi 10-15 cm. longa tereto-angulata, bracteis lanceolatis acuminatis 6 mm. longis erectis, floribus densiusculis a se 3-7 mm. remotis, pedicellis 2 mm. longis, ovariis 3-4 mm. longis clavato-teretibus apice truncatis basi attenuatis, floribus subclausis 4 mm. longis.

Sepalum posticum erectum linear-oblongum 5 mm. longum 2 mm. latum apice obtusum basi haud contractum 2 mm. latum 1-nervium dorso carinato-costatum secus costas subplicato-concavum, lateralia cum postico conformia. Petala angustissime linearia 5 mm. longa  $\frac{1}{2}$  mm. lata erecta 1-nervia 1-costata basi non contracta vix vel haud dilatata apice obtusa haud reflexa. Labellum subpatens in explicato sub-rotundatum  $4\frac{1}{2}$  mm. longum  $3\frac{1}{2}$  mm. latum apice cuspidatum, partibus cuspidatis elongato-triangularibus  $1\frac{1}{2}$  mm. longis basi 1- $1\frac{1}{2}$  mm. latis apice obtusis

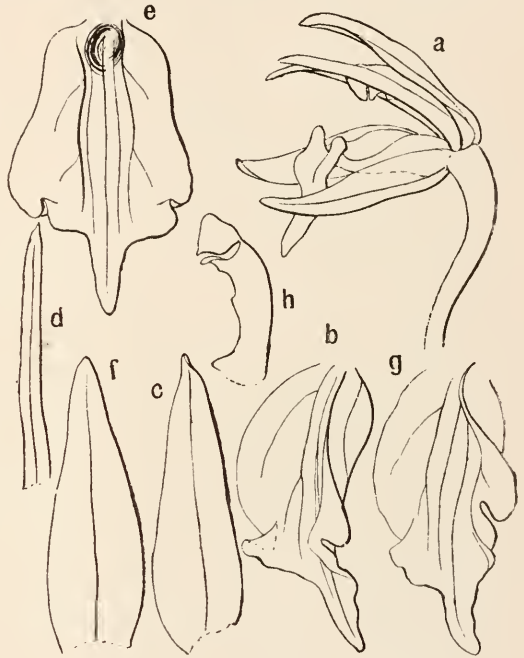


Fig. 8, *Liparis platybolba* HAYATA; a, a flower; f, a dorsal sepal; c, a lateral sepal; d, a petal; e, a lip seen from front; b, and g, the same, seen from side; h, a column, seen from side.

desuper leviter recurvis, a infra partem cuspidatam deorsum rotundatum, partibus rotundatis (i.e. hypochilis) 3 mm. longis totiusque latis vel latioribus distincte 5-nerviis suberectis basi medio valde concavis utroque latere suberectis, glabrum inter partem cuspidatam (epichilum) et partem rotundatam (hypochilum) valde ad marginem undulato-plicatum, margine deorsum prope basin integerrimum sursum sub eroso-denticulatum vel subintegrum. Columna 2 mm. longa fere semiteres apice clavata usque ad supra basin angustata basin leviter

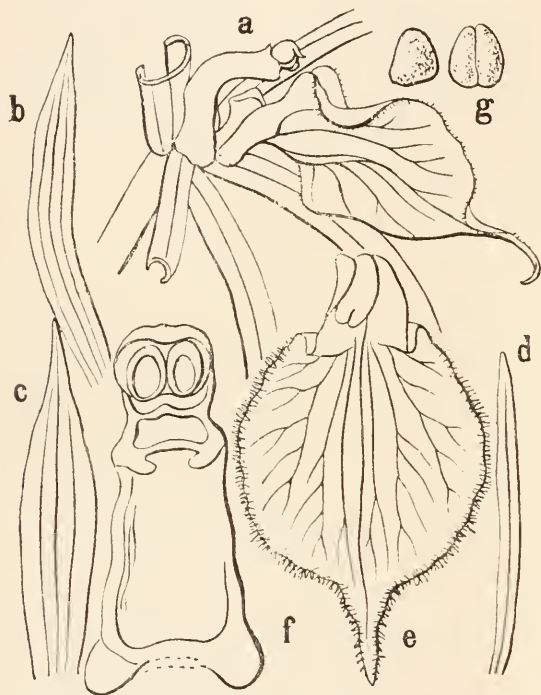


Fig. 9, *Liparis Sasakii* HAYATA; a, central portion of a flower; c, a dorsal sepal; b, a lateral sepal; d, a petal; e, a lip; f, a column; g, pollinia.

dilatata. Clinandrium valde concavum. Pollinia 4, per paria in loculis segregata Capsulæ racemosæ subsecundæ obovato-fusiformes apice clavato-rotundatæ basi fusiforme-attenuatæ 3-costatæ, inter costas 1-nervatæ, in sectione subcirculares, pedicellis 3 mm. longis. *Cestichis platybolba* HAYATA in sched. Herb. Taihoku.

HAB. Arisan, inter Funkiko et Taroyen, leg. B. HAYATA et T. ITO Mart. 1914.

Remarkable for the very much laterally compressed pseudobulbs.

### ***Liparis Sasakii***

HAYATA sp. nov. (Fig. 9.)

Epiphyta in trunco *Chamæcyparis obtusæ*. Caulis 8 cm. longus basi squamis multis obtectus, squamis ovato-rotundatis caulem amplectantibus 2 cm. longis totiusque latis vaginiformibus. Folia 2 fere sessilia obovata 5 cm. longa  $2\frac{1}{2}$  cm. lata apice obtusa vel rotundata deorsum angustata complete lateque caulem amplectantia. Scapi inter folia siti 7 cm. longi angulati,

partibus floriferis 2 cm. longis, bracteis cordato-cuspidiformibus 3 mm. longis basi latissimis 2 mm. latis apice subito angustatis cuspidatis ad summum obtusis, pedicellis 6 mm. longis, ovariis 2 mm. longis. Flores atro-purpurei. Sepalum posticum lineari-lanceolatum 13 mm. longum 3 mm. latum apice acuminatum basi cordatim auriculatum 3-nerviis margine exteriori valde recurvum, lateralia postico æquiformia sed  $\pm$  obliqua. Petala linearia 12 mm. longa 1 mm. lata apice obtuso-acuta basi non contracta margine exteriori valde recurva. Labellum rotundato-obovatum 1 cm. longum 6 mm. latum apice rotundatum ad centrum breve cuspidatum, (cuspidibus  $1\frac{1}{2}$  mm. longis basi  $\frac{2}{3}$  mm. latis elongato-triangularibus), margine ciliolatum versus longitudinem subplicatum infra medium abrupte desuper reflexum basi contractum breve minuteque auriculatum ad basin appendicula una elevata instructum. Columna 3 mm. longa utroque latere alata, alis  $\frac{1}{2}$  mm. latis.

HAB. Mt. Arisan, leg. S. SASAKI, 1913, Mai.

Near *Liparis Henryi* ROLFE, but differs from it by the much smaller form, shortly caudate and ciliate lips and appendicules at the base of the lip.

**Liparis Somai** HAYATA sp. nov. (Tab. VI.) = *Cestichis Somai* HAYATA. Rhizoma . . . . Pseudobulbi ovoidei 4 cm. longi 2 cm. lati apice 2-foliati basi vaginis scariosis involuerati. Folia 2 oblanceolata vel spathulata 13 cm. longa 2 cm. lata apice obtusa basi attenuata plicata racemum amplexantia in exsiccatto chartacea, venis parallelis utraque pagine elevatis. Racemi 15 cm. longi, pedunculis (partibus racemi non-floriferis) 5–6 cm. longis latere complanatis alatis cum alis 2 mm. latis, partibus floriferis dense floratis 10 cm. longis, pedicellis (exceptis ovariis) ascendentibus 3 mm. longis, bracteis lanceolatis 5 mm. longis 1 mm. latis apice acuminatis. Sepalum posticum lanceolatum 3 mm. longum 1 mm. latum apice obtusum basi haud contractum, lateralia valde obliqua oblique ovata 3 mm. longa  $1\frac{1}{2}$  mm. lata apice obtusa basi vix contracta. Petala linearia  $2\frac{2}{3}$  mm. longa  $\frac{1}{2}$  mm. lata apice acuminata basi non contracta. Labellum ovatum 3 mm. longum 2 mm. latum apice triangulari-acutum ad summum obtusum basi cordatim contractum ad medium plicato-recurvum. Columna tenuis  $1\frac{1}{2}$  mm. longa apice alata vel apice antice dentibus 2 instructa, dentibus obtusis minutis.

HAB. Kuskusu, leg. T. SŌMA, Jan. 1912.



Near *Liparis congesta*, but differs from it in having larger leaves and flowers.

***Liparis taiwaniana* HAYATA** (Fig. 10, et Tab. VII.) Caulis brevissimus in pseudobulbum incrassatus 2-foliatus, vaginis brevioribus 5-6 instructus. Folia oblanceolata 18 cm. longa 17 mm. lata apice acuminata basi attenuata ima basi articulata 3-costata. Racemi ad apicem caulium laterales cum pedunculis 20 cm. longi folio æquilongi, partibus floriferis 8 cm. longis laxi-

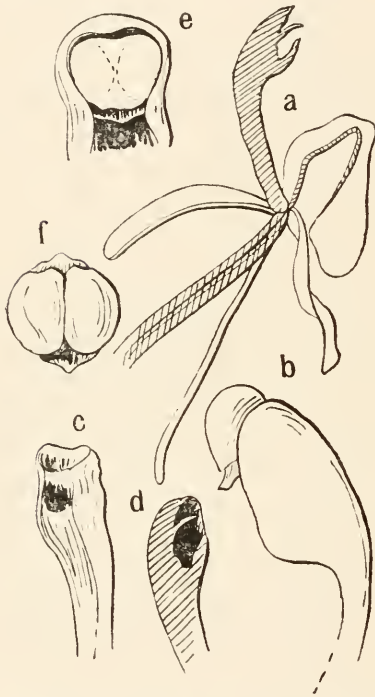


Fig. 10, *Liparis taiwaniana* HAYATA; a, a flower in vertical section; b, a column, seen from side; c, the same, seen from front, anther taken off; d, the same, in vertical section; e, apical portion of the column; f, an anther.

floratis, bracteis lanceolatis 7 mm. longis, floribus mediocribus 1 cm. in diametro. Sepala æqualia patentissima, exteriore valde reflexa recurva oblongo-linearia 1 cm. longa  $1\frac{3}{4}$  mm. lata apice obtusa. Petala angusto-linearia 1 cm. longa  $\frac{1}{2}$  mm. lata sursum margine convoluta teretia apice obtusa postice reflexa. Labellum ad basin columnæ, basi erectum a medio sursum patens, ima basi auriculatum, obovatum in circumscriptione 8 mm. longum apice dilatatum 7 mm. latum versus basin angustatum basi  $2\frac{1}{2}$  mm. latum margine latere integrum apice inæqualiter denticulatum lobis lateralibus obscuris, supra basin 2-tuberculatum. Columna 6 mm. longa semiteres 2-alata apice incurvata.

HAB. Nantō: Randaizan, leg. T. KAWAKAMI et U. MORI, Jan. 1908, (No. 6309).

This is near *L. plicata* and *L.*

*Uchiyamæ*, but distinguishable from them

by the longer and more slender column of the flowers. The columns of the other species are very much shorter. Also very near *Liparis viridiflora* L., but differs from it in having larger flowers and in the lips with obscure lobes.



**Liparis Uchiyamæ** SCHLECHT. (Fig. 11) in lit. MATSUM. Ind. Pl. Jap.

II-1, p. 235.

Compared with  
a co-type of this  
species.

HAB. Rin-  
kiho, ad 4000  
ped. alt., leg. II.  
INABA, Juli. 1911.

This is per-  
haps the same  
species as *L.*  
*plicata* FR. et SAY.

**Oreorchis** LINDL.**Oreorchis****Fargesii** FINETvar. **subcapita****tata** HAYATA

(Fig. 12) Ic. Pl.

Formos. II. p.

142. Terrestriis,

pseudobulbis

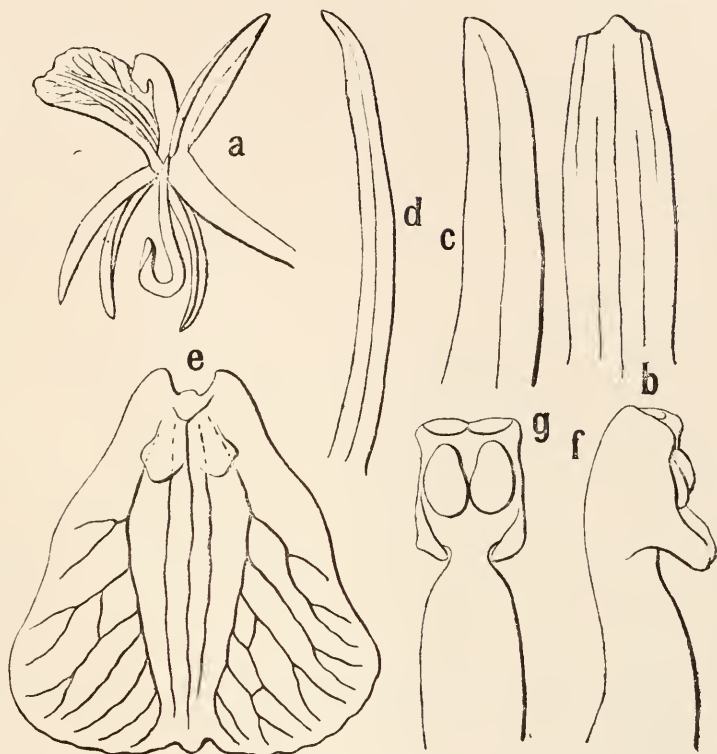


Fig. 11, *Liparis Uchiyamæ* SCHLECHT.; a, a flower; b, a dorsal sepal; c, a lateral sepal; d, a petal; e, a lip; f, a column, seen from side; g, the same, seen from front.

3-4 nodosis ovoideis  $1\frac{1}{2}$  cm. longis 1 cm. latis apice rostratis basi rotundatis ad nodos squamis obtectis. Folia duo terminalia basi vaginis involucreta lineari-lanceolata, (excepte petiolum) 30 cm. longa 12 mm. lata apice acuminata basi attenuata ad petiolum 5 cm. longum abeuntia membranacea nervoso-plicata, cum petiolis articulata. Scapi e nodis juxta terminalem oriundi quam foliis breviores 20-25 cm. longi 3-4 nodosi ad nodos vaginati vaginis 4 cm. longis, laminis acutis, partibus floriferis brevibus 2 cm. longis floribus dense subcapitatum dispositis, pedicellis gracilibus (cum ovariis) 8 mm.-10 mm. longis, bracteis lanceolatis 4 mm. longis. Sepala sub-potentia subæqualia, posticum lanceolatum 11 mm. longum  $2\frac{2}{3}$  mm. latum apice obtusum basi plus minus angustum obscure 5-nervium, lateralia quam postico latiora oblique ovato-

lanceolata 9 mm. longa  $3\frac{1}{2}$  mm. lata distincte 5-nervia apice obtusa basi leviter contracta falcata. Petala oblique oblongo-lanceolata quam sepalis lateralibus angustiora 10 mm. longa 30 mm. lata apice obtusa distincte 5-nervia minute punctata. Labellum cuneato-obovatum basi unguiculatum, (cum unguibus  $1\frac{1}{2}$  mm. longis) 8 mm. longum 3 mm. latum ex apice unguis 3-lobatum, lobis lateralibus linearibus 2 mm. longis  $\frac{1}{3}$  mm. latis 1-nerviis apice obtusis, lobo medio oblongo-obovato 6 mm. longo 3 mm. lato margine denticulato-cristato,

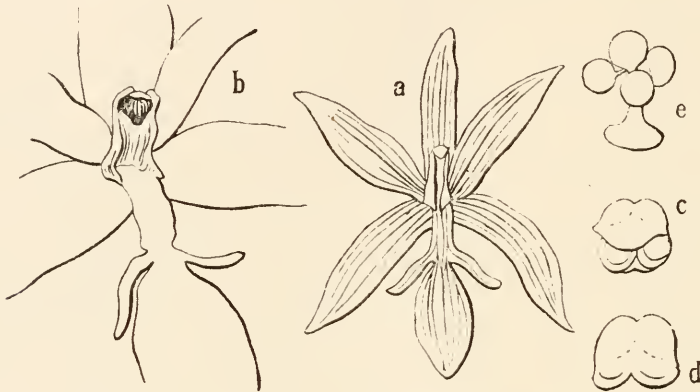


Fig. 12, *Oreorchis Fargesii* FINET var. *subcapitata* HAYATA; a, a flower; b, central portion of the same; c, an anther; d, the same, seen from back; e, pollinarium.

5-nervio facie parse punctato-cristato basi medio 1-lamellato-appendiculato, appendiculo plicato lineari 1 mm. longo. Columna brevis 2 mm. longa leviter alata basi auriculata in pedem brevissimum producta.

HAB. Mt. Rontabun, leg. U. MORI, Aprili., 1910.

Near *O. Fargesii* FINET, in Bull. Soc. Bot. Fr. (1896) XLIII. p. 697, Pl. XIII.; but differs from the type in having lips with oblong middle lobes, much shorter column and punctate petals.

#### *Dendrobium* Sw.

***Dendrobium erythroglossum* HAYATA sp. nov.** (Fig. 13, a) Caulis gracilis teres 30–40 cm. longus 1 mm. in diametro sectionis ramosissimus, internodiis 2–3 cm. longis cylindricis, ad nodos reliquis vaginarum fibrosis instructus hac atque illac tumido-dilatatus, partibus dilatatis fusiformibus 2 cm. longis  $2\frac{1}{2}$  mm. latis, sursum vaginis foliorum obtectus, vaginis cum internodiis

æquilongis cylindricis ore truncatis nervosis. Folia ad ramos superiores alternim sita linearia 5 cm. longa 3 mm. lata apice obtusissima ad centrum breve mucronata, in exsiccatō membranacea, basi subito contracta cum vaginis articulata. Racemi laterales 2-3 cm. longi pauci-florati sæpe 1-florati basi 1-2-vaginati, vaginis cylindræis 5 mm. longis, bracteis hyalinis ovatis pedicellum amplexantibus, pedicellis cum ovariis  $1\frac{1}{2}$  cm. longis. Flores rubescentes  $3\frac{1}{2}$  cm. in diametro. Sepalum posticum ovato-lanceolatum 33 mm. longum 8 mm. latum apice acuminatum basi leviter contractum margine deorsum exteriore recurvum  $\pm$  convexum 7-nerviū, lateralia lineari-lanceolata basi obliqua latere inferiore 33 mm. longa latere superiore 28 mm. longa apice acuminata basi latissima 8 mm. lata medio 5 mm. lata basi cum pede columnæ connata mentum 6 mm. longum formantia. Petala ovato-rhomboidæa 33 mm. longa cum sepalo æquilonga 15 mm. lata apice triangulari-acuminata basi cuneata 5-nervia margine integra ad basin 3 mm. lata. Labellum cum sepalo petaloque æquilongum 33 mm. longum 18 mm. latum ovato-rhomboidæum apice cuspidato-acutum basi cuneatum margine (exceptis partibus basilaribus) serrulato-denticulatum a medio usque ad basin crassiusculum cæterum tenue facie ubique breve hirsutum 3-lobum, lobis lateralibus (basilaribus) semirotundatis suberectis brevibus, lobo terminali majusculo triangulari-ovato 17 mm. longo 16 mm. lato apice breve cuspidato-acuto basi vix vel haud contracto. Columna 2 mm. longa totiusque lata basi in pedem 6 mm. longum 3 mm. latum producta. Anthera oblonga 3 mm. longa breve hirsuta, filamentis filiformibus 2 mm. longis.

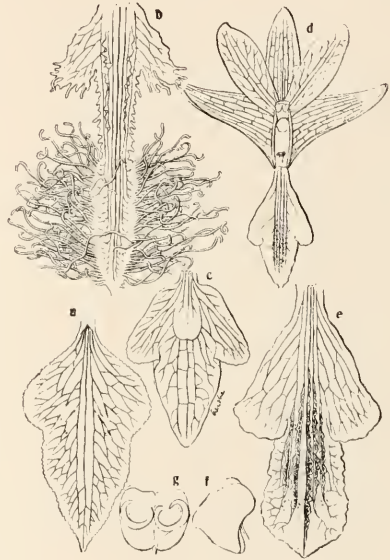


Fig. 13, a, a lip of *Dendrobium erythroglossum* HAYATA; b, a lip of *Dendrob. fimbriatolabellum* HAYATA; c, a lip of *Dendrobium leishanense* HAYATA; d-g, *Dendrobium kwashotense* HAYATA; d, a flower, lip taken down to show a gland at the base of the kin; e, a lip; f, an operculum; g, the same, lifted up; a, c, natural size, others more or less magnified.

HAB. Formosa: Loco non indicato; cult. in seminario Taihoku, leg. R. KANEHIRA, Juni. 1912.

**Dendrobium fimbriatolabellum** HAYATA sp. nov. (Fig. 13, b) = *Desmotrichum fimbriatolabellum* HAYATA in sched. herb. Taihoku. Caulis 40–60 cm. altus teres ramosissimus, internodiis  $1\frac{1}{2}$ –2 cm. longis subclavato-cylindricis 7 mm. in diametro, ad nodos subnudus vel subsquamatus nitidus in exsiccatō flavescens subsulcatus, ramis basi angustatis sursum plus minus dilatatis sursum plus ramosis, internodiis terminalibus majoribus circ. 3 cm. longis clavatis apice dilatatis circ. 9 mm. in diametro sectionis. Gemmæ ad apicem rami geminae vel fasciculatae divaricatae elongato-conicae 1 cm. longae. Folia ad apicem ramulorum sita cum nodis articulata oblonga oblongo-elliptica vel ovato-oblonga 10 cm. longa  $3\frac{1}{2}$  cm. lata apice rotundata ad centrum obscure leviter emarginata basi rotundato-contracta ad petiolum 4 mm. longum abeuntia supra nitida in exsiccatō subcoriacea vivo coriacea crassiuscula, nervis principalibus circ. 11 utraque pagine elevatis, venis inter nervos circ. 3, margine desuper  $\pm$  recurva, petiolis plicatis 4 mm. longis 3 mm. latis cum nodis articulatis, vaginis nullis. Racemi breves  $1\frac{1}{2}$  cm. longi ad apicem ramulorum siti pauciflorati, bracteis multiseriatis scariosis ovato-lanceolatis 3–5 mm. longis acuminateis, pedicellis cum ovaris  $1\frac{1}{2}$  cm. longis gracilibus, floribus subalbescenscentibus  $1\frac{1}{2}$  cm. longis. Sepalum posticum lineari-lanceolatum  $1\frac{1}{2}$  cm. longum  $3\frac{1}{2}$  mm. latum apice acuminatum 5-nerviū basi non contractum plus minus concavum vel subplanum, lateralia lineari-lanceolata  $1\frac{1}{2}$  cm. longa 3 mm. lata apice acuta plus minus obliqua basi dilatata 5 mm. lata cum pede columnæ affixa mentum 3 mm. longum formantia 5-nervia. Petala linearia  $1\frac{1}{2}$  cm. longa  $1\frac{1}{2}$  mm. lata apice acuta basi non contracta 3-nervia. Labellum lineare (exceptis partibus fimbriatis)  $1\frac{1}{2}$  cm. longum  $2\frac{1}{2}$  mm. latum apice acutum basi cuneatum 3-lobum, lobis lateralibus (basilaribus) oblongis angulo  $45^\circ$  lobo centrali divaricatis 4 mm. longis  $1\frac{1}{2}$  mm. latis margine fimbriatis, fimbriis 1 mm. longis linearibus, lobo centrali lineari 12 mm. longo 2 mm. lato basi apiceque  $\pm$  dilatato, parte dilatata superiore oblonga 7 mm. longa 3 mm. lata apice apiculato-acuta margine prope apicem integra cæterum valde fimbriata, fimbriis filiformibus  $1\frac{1}{2}$  cm. longis  $\frac{1}{10}$  mm. latis 1-nerviis angulo recto a lobo centrali divaricatis, medio subintegro



vel crenulato, discis medio a basi usque ad partem dilatatam superiorem 2-lamellatis instructum, lamellis circ. 10 mm. longis 1 mm. latis margine undulato-crispatis, 5-nervium basi integrum. Columna 3 mm. longa basi ad mentum 3 mm. longum producta.

HAB. KUSUKUSU, leg. B. HAYATA et S. SASAKI, 1912, Juli.

Flowers of this new orchid are somewhat near to those of *Desmotrichum spurium* J. J. SMITH, *D. angulatum* BLUME and *D. criniferum* KRÄNZL, (in Pfl.-reich. IV. 50, II. B. 21, p. 347, fig. 35 A-H.); but the branches are totally different.

**Dendrobium furcatopedicellatum** HAYATA sp. nov. (Fig. 14). Caulis teres rectus 40–30 cm. longus .2 mm. in diametro sursum foliatus a medio deorsum non foliatus vaginis foliorum obtectus. Folia linearia circ. 11 cm. longa 4 mm. lata apice acuminata basi æquilata vel leviter contracta 3-nervia membranacea in exsiccato tenuiter coriacea, vaginis tubiformibus  $3\frac{1}{2}$  cm. longis internodio vix longioribus caulem firme obtegentibus. Cymæ laterales 2-floratae, pedunculis 13 mm. longis, basi

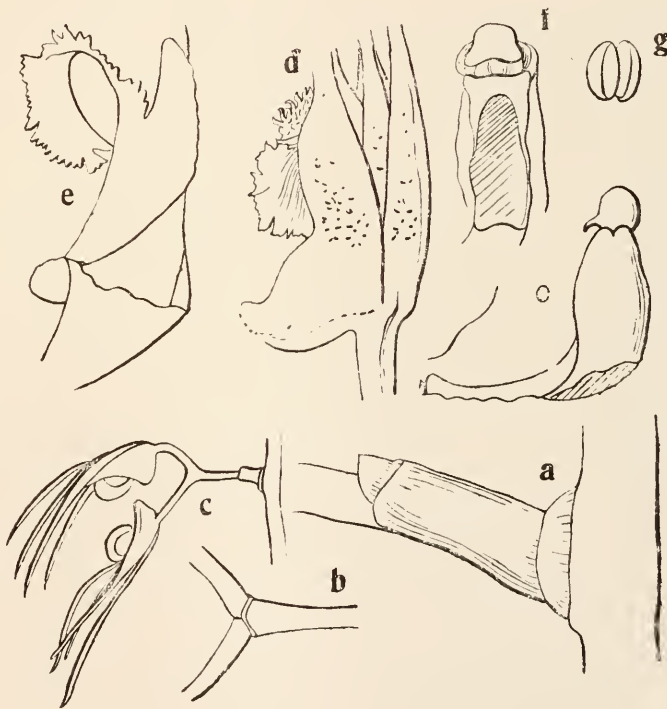


Fig. 14, *Dendrobium furcatopedicellatum* HAYATA; a, basal portion of a peduncle; b, basal portion of pedicels; c, inflorescence; d, basal portion of a flower, showing purple dots in the petals and sepals; e, the same, sepals and petals taken off, to show the labellum, articulation of the same and mentum; f, mentum and column; g, a column, stigma, rostellum, clinandrium and anther are seen; g, two pollinia, each of which is divided into two.



bracteis tubiformibus 1-2 instructis, pedicellis 10 mm. longis a se angulo 80° egressis. Flores subclausi non patentis 30 mm. longi. Sepala erecta lanceolato-lineariter flavescentia medio extus purpureo-maculato-punctata; posticum 30 mm. longum deorsum lanceolatum sursum lineare revolutum-filiforme, supra basin latissimum 3½ mm. latum, lateralia postico æquilonga leviter latiora basi obliqua cum pede columnæ connata mentum 5 mm. longum formantia, mento antice ± recurvo. Petala sepalo æquilonga angustiora. Labellum 3-lobum margine fimbriato-denticulatum, disco piloso.

HAB. Maisha, leg. B. HAYATA et S. SASAKI, Aug. 1912.

Near *D. biflorum* SWARTZ (PFITZER, in Pfl.-reich. IV. 50, II. B. 21. p. 168, fig. 11, A-D.); but differs from it in having lips with pilose discs.

**Dendrobium heishanense** HAYATA sp. nov. (Fig. 13, c). Epiphyta. Rhizoma ramosa tenue in truncos arboris repens, caulibus approximatis sitis. Caulis 30-40 cm. longus teres sursum latissimus deorsum minus latus basi ± dilatatus medio 4-5 mm. latus basi supra partem dilatatam 2 mm. latus, partibus dilatatis conicis 5 mm. longis 6 mm. latis, radicibus sub parte dilatata dense sitis, internodiis mediis 3½ cm. longis, inferioribus clavatis subnullis, superioribus cylindricis vagina obtectis, vaginis cylindricis cum internodiis æquilongis ore truncatis. Folia lanceolata 6 cm. longa 8 mm. lata apice acuminata vel obtuso-attenuata basi contracta basi tortuosa in exsiccato tenuiter chartacea cum vaginis articulata. Racemi laterales ad nodos superiores siti brevissimi dense florati, bracteis basi imbricatis ovato-triangularibus valde concavis scariosis 3-5 mm. longis, pedicellis 18 mm. longis gracilibus, ovariis brevissimis 2 mm. longis 1½ mm. latis. Flores albo-rosei 2-2½ cm. in diametro. Sepalum posticum ovato-oblongum 18 mm. longum 6 mm. latum apice obtuso-acutum basi ± contractum 5-nerviū, lateralia oblique ovato-triangularia 2 cm. longa basi 1 cm. lata apice obtuso-acuta basi cum pede columnæ connata mentum 8 mm. longum ± ∪-formiter recurvum formantia 5-nervia. Petala oblonga 18 mm. longa 6 mm. lata apice obtusa basi cuneata manifeste 3-nervia vel obscure 5-nervia. Labellum late rhomboideum 17 mm. longum 13 mm. latum ad basin contractum ad apicem menti affixum 3-lobatum, lobis lateralibus (basalibus) triangularibus 4-3 mm. longis erectis apice obtusis, lobo terminali triangulari-oblongo 10 mm. longo 7 mm. lato apice

triangulari-obtuso basi leviter vel vix contracto. Labellum medio infra lobum terminalem callo uno instructum, callo rotundato 2-3 mm. in diametro, lobis lateralibus facie breve hirsutis, cæterum glabrum. Columna brevissima 1 mm. longa basi ad pedem valde concavum sacciformem latissimum 10 mm. longum (in explicato) 7 mm. latum producta.

HAB. Arisan: inter Heishana et Nimandaira, ad 7000 ped. alt., leg. B. HAYATA, Aprili., 1914.

This is near *Dendrobium candidum* WALL. in Ann. Roy. Bot. Gard. Calc. V. t. 19, in the broad concave mentum, in the size of the flowers and discs; but in other respects it is altogether different.

**Dendrobium kwashotense** HAYATA sp. nov. (Fig. 13, d-g, et fig. 15). Caulis secus rhizoma approximativè situs 40-50 cm. longus basi pseudobulboso-dilatatus, pseudobulbis globoso-conicis 2-3-nodosis 7 mm. latis totiusque longis subnudis, parte supra pseudobulbos angustata tereti, partibus angustatis 2-3 cm. longis 5 mm. latis teretibus 1-2-nodosis, parte supra partem angustatam fusiforme-dilatata, partibus fusiformibus 5-10 cm. longis  $1\frac{1}{2}$ -2 cm. in diametro profunde 8-sulcatis 8-costatis 3-4-nodosis nudis, parte supra partem fusiformem complanata, partibus complanatis 10-25 cm. longis cum vaginis 7-9 mm. latis 6-8-nodosis, internodiis complanato-clavatis 2-3 cm. longis a vaginis perfecte obtectis, parte supra partem complanata tereti, partibus teretibus 10-15 cm. longis 3-4 mm. in diametro subnudis, internodiis  $2\frac{1}{2}$ -3 cm. longis. Folia ovato-oblonga 6 cm. longa 23 mm. lata valde coriacea apice obtusissima ad summum brevissime inæqualiter 2-loba, lobo longiore  $\frac{1}{2}$  mm. longo apice obtuso, lobo brevior subnullo, basi subrotundata cum vaginis articulata, vaginis complanato-cylindraceis 2 cm. longis 7 mm. latis ore truncatis, supra nitida, nervis venis paucis prominente elevatis, subtus venis multis minus prominente tenuissime elevatis, margine desuper recurva. Flores ad nodos superiores lateraliter subsolitarii vel paucè racemosi, pedicellis (cum ovariis) 2 cm. longis teretibus validiusculis 2 mm. in diametro, basi vagina singula instructis, vaginis cylindricis 6 mm. longis  $2\frac{1}{2}$  mm. in diametro scariosis nervosis apice 5-4-lobatis, lobis triangularibus 2 mm. longis acutis. Flores apertientes 5 cm. in diametro. Sepalum posticum lanceolatum 23 mm. longum 6 mm. latum apice obtusum basi non contractum,

marginē sursum interiore recurvum 5-7-nervum, lateralia lanceolata triangularia latere inferiore 3 cm. longa latere superiore 2 cm. longa apicē obtusa basi 13 mm. lata 7-nervia marginē sursum interiore recurva. Petala lanceolata 12 mm. longa  $6\frac{1}{2}$  mm. lata, apicē acuto-obtusa basi contracta obscure 7-nervia. Labellum obovato-oblongum 28 mm. longum 24 mm. latum apicē breve acutum basi longē cuneatum multinervium tenuiter 3-lobum, lobis



Fig. 15, *Dendrobium kwashotense* HAYATA, photographed by Mr. T. SŌMA.

basiralibus (lateralibus) semi-oblongis a basi labelli usque ad apicem loborum lateralium  $1\frac{1}{2}$  cm. longis, ex apice loborum usque ad sinus intra lobos laterales et lobum terminalem 2 mm. longis apicē truncatis, lobo terminali oblongo  $1\frac{1}{2}$  cm. longo circ. 1 cm. lato apicē apiculato basi  $\pm$  contracto marginē crenulato-denticulato.

Disci medio a

basi usque ad medium labelli 3-striatim siti, striis deorsum crassiuscule lamellatis sursum cristato-tuberculatis. Columna subnulla 4 mm. lata basi ad mentum 14 mm. longum 3 mm. latum planum crassum 3-nervium producta, mentis sursum prope apicem disco singulo instructis, disco flabelliformi substipitato 3 mm. lato 1 mm. longo flavo, stipite 3 mm. longo toto connato.

HAB. Kwashōtō, leg. T. SŌMA, Juni. 1913.

**Dendrobium leptocladum** HAYATA n. n. *Dendrobium tenuicaule* HAYATA (non HOOK. f.) Mater. Flor. Formos. p. 316.

As *D. tenuicaule* is given to an Indian orchid, another new name *D. leptocladum* should be given to this Formosan species.

**Dendrobium longicalcaratum** HAYATA sp. nov. (Tab. VIII). Epiphyta, in arbores crescens. Caulis foliiferus circ. 15 cm. longus, internodiis 1 cm. longis vaginis obtectis, vaginis quam internodiis longioribus scariosis obconico-cylindraceis hyalinis nervosis ore truncatis. Folia lanceolata 35 mm. longa 6-7 mm. lata apice acuminata basi contracta in exsiccatō membranacea. Racemi ad apicem internodii laterales circ. 3 cm. longi 1-2-3-floriferi, bracteis triangularibus 6 mm. longis 5 mm. latis apice acutis 3-nerviis, rhachibus flexuosis purpureis, pedicellis 1 cm. longis, ovariis 3 mm. longis. Sepala extus leviter purpurea rubescentia 5-nervia, nervis purpureis, intus albo-viridescencia. Petala alba. Sepalum posticum triangulari-oblongum 15 mm. longum 7 mm. latum apice acuto-obtusum margine ad apicem incurvum basi leviter contractum; lateralia valde obliqua, partibus supra insertionem ovarii lineari-oblongis vel oblongis 13 mm. longis 6 mm. latis apice acuto-obtusis, partibus infra insertionem ovarii 15 mm. longis quam iis supra insertionem longioribus 4 mm. latis cum pede columnæ connatis mentum 15 mm. longum 4 mm. latum cylindricum formantibus, mente apice obtuso. Petala oblique lanceolato-obovata apice obtusa basi angustata 14 mm. longa medio 5 mm. lata ad insertionem 2½ mm. lata 5-nervia. Labellum elongato-spathulatum basi cum mentum connatum, a basi sursum liberum longe unguiculatum cum unguibus 27 mm. longum 6 mm. latum, ungue 22 mm. longo lineari circ. 3 mm. lato basi cum mentum connato hac atque illac contracto margine ubique interiore plicato apice margine exteriorē plicato constricto, parte supra constrictionem (lamina) ovata 9 mm. longa 5 mm. lata apice rotundato-obtusa. Discus apice et medio unguis situs 2-lamellatus. Columna supra insertionem brevissima 2 mm. longa, pede longissimo 18 mm. longo.

HAB. Urai, Aug. 1912, leg. B. HAYATA et S. SASAKI; fl. Nov. 1912 in horto botanico Tōkyō.



Very near *Dend. Victoria-reginæ* LOHER and *D. subclausum* ROLFE (KRÄNZL. in Pfl.-reich. IV. 50, II. B, p. 11, fig. 6, A-G).

***Dendrobium moniliforme*** Sw. Compared with a specimen of the species in the Tōkyō herbarium.

HAB. Arisan, inter Taroyen et Funkiko, leg. B. HAYATA et T. ITO, Mart. 1914.

The form of the lips is subject to some mutability. It is ovate to rhomboidal, obtuse or acute at the apex, very much hirsute or nearly glabrous;

and the callosities at the base of the lips are in one specimen very prominent, but in another very faint.

***Dendrobium pendulicaule*** HAYATA sp. nov. (Fig. 16) = (*Aporom pendulicaule* HAYATA in Herb. Taihoku Museum). Epiphyta; caulis caespitosus, a summo ramorum arboris altissimæ verticaliter pendulus 30–50 cm. longus lateraliter valde compressus, cum foliis 7 cm. latus viridissimus toto longitudine foliosus glaber. Folia disticha equitantia firme

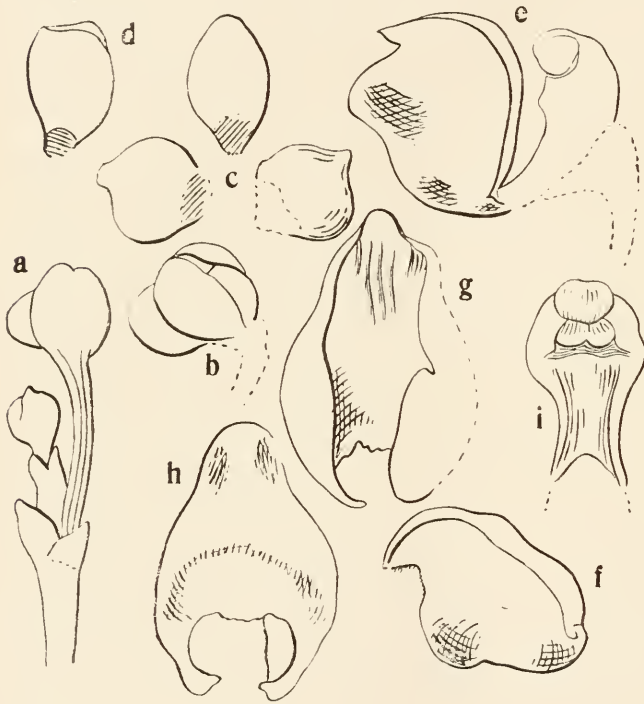


Fig. 16, *Dendrobium pendulicaule* HAYATA; a, inflorescence; b, a flower-bud; c, sepals; d, a petal; e, a flower, sepals and petals taken off, to show the lip, cross lines show yellowly tinted portions; f, a lip, seen from side; g, the same, seen from front; h, the same, seen from below; i, a column and foot; yellow maculations on the lip are crossed.

plicata (in exsiccato membranacea) plicato semi-oblonga (explicato oblonga) 5 cm. longa plicato 1½ cm. lata, explicato 26 mm. lata, explicato 10-nervia basi



cum vaginis articulata, vaginis imbricatis 3-4 cm. longis firmæ caulem obtegentibus. Racemi pauciflorati laterales, bracteis minutis. Flores circ. 4 mm. longi albicantes. Sepala oblonga, lateralia quam postico latiora. Petala sepalo conformia. Labellum subsaccatum vel valde concavum apice valde sinuatum flavo-maculatum basi disco 3-striato hirsuto instructum. Capsula cylindrica circ. 10 cm. longa 8 mm. lata.

HAB. KUSUKUSU, leg. B. HAYATA et S. SASAKI, Juli., 1912.

Found hanging perpendicularly from a branch of a very tall tree, swinging to and fro even with a very gentle breeze.

*Bulbophyllum* THOU.

***Bulbophyllum* (*Cirrhopetalum*) *flavisepalum* HAYATA (Fig. 17) Ic.**

Pl. Formos. II. p. 131.

Epiphyta, rhizomatibus repentibus radican-  
tibus teretibus 2 mm.  
in diametro sectionis,  
pseudobulbis ovoideis  
2 cm. longis 1 cm. latis  
apice obtusis truncatis 1-  
foliatis. Folia elongato-  
angustato-oblonga 7 cm.  
longa 17 mm. lata apice  
rotundata basi attenuata  
cum pseudobulbis  
articulata margine levi-  
ter recurva supra  
viridia subtus pallidiora  
crassiuscula supra  
plana, venis (in  
exsiccat) utroque latere



Fig. 17, *Bulbophyllum flavisepalum* HAYATA; a, a flower, seen from side; b, the same, a sepal, labellum, and mentum are seen, others are taken off; c, the same lateral sepals, labellum and mentum taken off, seen from face, column is seen; d, a labellum seen from face, elevated discus lines are seen; e, mentum and labellum, seen from below; f, column, seen from face; g, the same, seen side; h, the same, seen from back; i, an anther; j, pollinia, two smaller, the others larger.

8-9, utraque pagine conspicuis. Scapi floriferi e latere pseudobulborum, aphylli 5-4 cm. longi, graciles vaginis tenuibus 3-4 instructi, vaginis inferioribus imbricatis, superioribus remotis ore obliquis acutis 6 mm. longis. Flores

5-10 flavescentes 1 cm. in longo diametro laxè umbellati rhachibus 2 mm. longis, pedicellis gracilibus 9-10 mm. longis basi 1-bracteatis, bracteis fusco-purpurascens 3 mm. longis. Sepala valde inæqualia, posticum liberum minus rubro-purpurascens ovato-quadrangulare  $3\frac{1}{2}$  mm. longum basi  $2\frac{1}{2}$  mm. latum 3-nervium basi latissimum leviter contractum apice obtusum lateralia valde longiora linearia 13 mm. longa 3 mm. lata 3-nervia sed basi 5-nervia flava nervis rubescentibus, apice obtusa basi plus minus obliqua basi columnæ pede adnata mentum 2 mm. longum formantia supra basin introse tortuosa latere exteriori a se cohærentia facie exteriori basi 3-lineari-maculata. Petala breviora quam sepalo postico oblonga 3 mm. longa  $1\frac{2}{3}$  mm. lata apice rotundata 3-nervia fusco-purpurascens leviter reflexa vel concava. Labellum brevius mentum in longitudine æquans basi erectum a medio sursum valde extrorse recurvum crassiusculum margine erectum apice obtusum acutum vel emarginatum medio discis linearibus 1 vel 2 instructum 2 mm. longum basi purpurascens. Columna brevissima  $1\frac{1}{2}$  mm. longa apice (clinandrium) latere bicornuta basi in pedem 2 mm. longum producta, (pede interiore recurvo lineari complanato) apice abrupte incurvis dilatatis. Anthera globosa,  $\frac{1}{2}$  mm. in diametro. Pollinia 4; 2 majora, 2 minora. Capsula prematura cylindrico-fusiformis 2 cm. longa 5 mm. lata apice obtusa basi attenuata triquetra facie leviter 1-costata. *Cirrhopetalum flavisepalum* HAYATA Herb. Taihoku.

HAB. Mt. Arisan, prope Taroyen, leg. B. HAYATA et S. SASAKI, Jan., 1912.

The orchid was found creeping on a large stone at a sunny place on the left side of the Arisan-road near Taroyen.

**Bulbophyllum gracillimum** HAYATA (Fig. 18) Ic. Pl. Formos. II p. 132. Epiphyta, caulibus gracillimis prostratis ad nodos radicanibus, teretibus  $\frac{2}{3}$  mm. in diametro sectionis, internodiis 1-2 cm. longis, ad nodos vaginatis, vaginis 3 mm. longis ore truncatis. Folia subsessilia crassa elliptica vel elongato-elliptica 22 mm. longa 9 mm. lata apice rotundata mucronata vel emarginata basi plus minus contracta ad petiolum 1-2 mm. longum abeuntia multinervia. Racemi axillares 1-2-florati 2 cm. longi graciles basi vaginati vaginis 1-2 mm. longis, basi pedicellorum 1-bracteati, bracteis ovatis acumi-

natis 3 mm. longis  $1\frac{1}{2}$  mm. latis, pedicellis cum ovario 2-3 mm. longis. Sepala inaequalia, posticum oblongo-angustatum 3 mm. longum  $1\frac{1}{3}$  mm. latum apice obtusum basi non contractum 3-nerviū, lateralia basi pede columnæ adnata basi valde obliqua 3-nervia 3 mm. longa. Petala minutissima linearia  $1\frac{1}{2}$  mm. longa 1-nervia. Label-lum  $1\frac{1}{2}$  mm. longum  $\frac{1}{3}$  mm. latum basi erectum interiore recurvum medio sursum abrupte exteriore recurvum medio marginis valde transverse repando-plicatum. Discus 3-lamellatus. Columna brevissima latere antice breve cornuta, basi in pedem  $1\frac{1}{3}$  mm. longum producta, cum sepalis mentum formans.

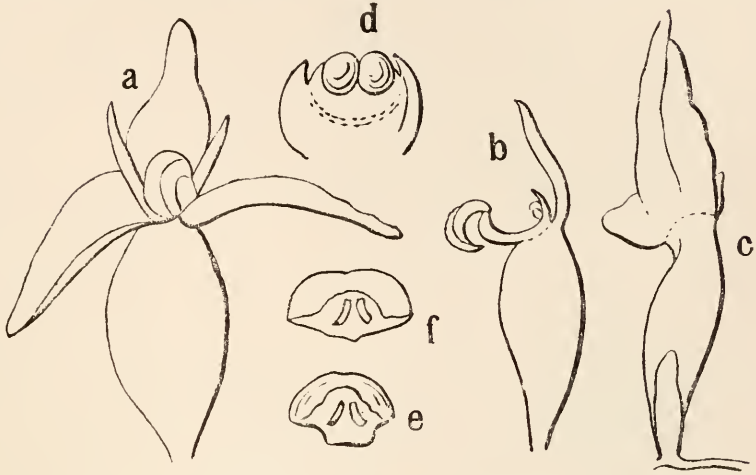


Fig. 18, *Bulbophyllum gracillimum* HAYATA; a, a flower; b, the same, seen from side, showing the columnal foot and lip; c, the same, seen from back; d, polinia on the clinandrium; e, and f, apertures.

tum interiore recurvum medio sursum abrupte exteriore recurvum medio marginis valde transverse repando-plicatum. Discus 3-lamellatus. Columna brevissima latere antice breve cornuta, basi in pedem  $1\frac{1}{3}$  mm. longum producta, cum sepalis mentum formans.

HAB. Nōkōzan, leg. T. KAWAKAMI et U. MORI, Jan., 1908.

***Bulbophyllum Inabai* HAYATA sp. nov. (Tab. IX.)** *Cirrhopetalum Inabai* HAYATA. Rhizoma repens teres 1 mm. in diametro. Pseudobulbi ovoidei circ. 1 cm. longi 5-6 mm. lati. Folia oblanceolata vel elongato-oblonga 5 cm. long 8 mm. lata apice obtusa ad summum mucronata basi  $\pm$  attenuata in exsiccato tenuiter chartacea, supra venis lateralibus parallelis tenuiter elevatis, subtus pallidissima. Scapi  $2\frac{1}{2}$  cm. longi apice flores 5-10 umbellato-racemosim gerentes, bracteis basi pedicellorum sitis lanceolatis scariosis  $1\frac{1}{2}$  mm. longis, pedicellis 4 mm. longis. Sepalum posticum lanceolatum  $3\frac{1}{2}$  mm. longum  $1\frac{1}{2}$  mm. latum apice caudato-acuminatum basi non contractum, lateralia obliqua triangulari-lanceolata 5 mm. longa basi 2 mm. lata sursum attenuata margine convoluta, dua firme margine interiore se attingentia basi cum pede columnæ connata.

Petala obovata 2 mm. longa  $1\frac{1}{3}$  mm. lata apice rotundata vel leviter retusa basi leviter cuneata basi 1 mm. lata. Labellum lineare 2 mm. longum  $\frac{1}{2}$  mm. latum crassum deorsum utroque latere auriculiforme sursum teretiforme apice retusum. Columna 1 mm. longa apice antice 2-cornibus instructa, cornibus aristæ-formibus rectis; pede 1 mm. longo angulo recto recurvo.

HAB. MAISHA, leg. H. INABA, 1911, Juli.

**Bulbophyllum kusukusense** HAYATA sp. nov. (Fig. 19) Epiphyta. Rhizoma in arbores repens teres  $2\frac{1}{2}$  mm. in diametro, reliquis vaginarum

fibrosis multis obtectum, infra partem insertionis folii radices filiformes subincrassatas abundante emittens. Pseudobulbi cylindrici 2-4 cm. longi 5-3 mm. in diametro (in exsiccat), apice folium unum gerentes. Folia crassa oblongo-linearia 10-15 cm. longa  $1\frac{1}{2}$ - $2\frac{1}{2}$  cm. lata apice obtusa ad summum retusa breve 2-lobata basi gradatim attenuata ad petiolum circ. 1 cm. longum abeuntia supra nitida viridissima subtus pallidissima supra ad costam subplicata, subtus costis acute elevatis, venis parallelis (in exsiccat) supra elevatis utroque latere costæ 9-10, subtus non visis margine integerrima tenuissima. Scapi 1-florati, basi pseudobulbi oriundi 5 cm. longi gracillimi basi bracteis



Fig. 19, *Bulbophyllum kusukusense* HAYATA, a a flower; b, the same of the petals and petals taken off, showing the column, columnal foot, and the lip. c, a lip, shaded portions tinted red; d, a lip; e, f, and g, sections of the same; h, and the column, seen from front; i, the same seen from side; j, k, an anther seen from different sides.

A and b, natural size; others variously magnified; red portions on the lip are shaded.

4-5 scariosis vaginatis instructi. Flores subalbi circ. 2 cm. longi, sepalis petalisque purpureo-striatis. Sepala inaequalia, posticum ovato-oblongum 17 mm.



longum 5-6 mm. latum apice acutum basi 5 mm. latum 5-nervium 5-purpureo-striatum, lateralia oblique oblonga postico latiora basi cum pede columnæ connata. Petala sepalo minus lata lanceolata 17 mm. longa 4-5 mm. lata apice acuta 5-nervia purpureo-striata. Labellum crassissimum triangulari-lineare 9 mm. longum  $1\frac{1}{2}$  mm. latum subplicatum flavum ad marginem rubro-maculatum, maculis linearibus. Columna 3 mm. longa basi ad pedem 4 mm. longum lineare producta. Operculum cuspidato-cordatum 2 mm. longum dorso facieque toto glanduloso-cristatum.

HAB. Kusukusu, Juni. 1912, leg. B. HAYATA et S. SASAKI. Very near *Bulbophyllum affine* LINDL., but differs from it by the more elongate anthers and in other points.

**Bulbophyllum melanoglossum** HAYATA sp. nov. (Tab. X.) = *Cirrhopetalum melanoglossum* HAYATA. Radices filiformes crispatae subincrassatae sub pseudobulbo e rhizomate fasciculatim oriundæ. Rhizoma in saxa arboresque repens teres  $1\frac{1}{2}$  mm. in diametro. Pseudobulbi ovati 1 cm. longi 6 mm. lati. Folia olongato-elliptica crassa  $3\frac{1}{2}$  cm. longa 7 mm. lata apice rotundata ad centrum retusa basi subito attenuata ad petiolum 2-3 mm. longum abeuntia supra nitida viridia subtus pallidissima, venis parallelis utraque pagine non visis. Scapi a basi pseudobulbi oriundi 9 cm. longi gracillimi basi 1-2 bracteis vaginiformibus instructi, ad apicem flores circ. 10 sub-umbellatim gerentes. Flores circ. 10 ad apicem scapi subumbellatim dispositi, pedicellis 6 mm. longis gracillimis basi bracteis lanceolatis 2 mm. longis instructis. Flores subpurpurei 12 mm. longi. Sepala inæqualia, posticum cum petalis firme imbricatum gleam formans intus valde concavum ovatum  $4\frac{1}{2}$  mm. longum  $2\frac{1}{2}$  mm. latum apice acuminatum margine longe ciliatum 5-striatum atro-purpureum, lateralia lanceolato-linearia  $1\frac{1}{2}$  cm. longa 2 mm. lata purpurea margine integra haud ciliolata  $\pm$  convoluta dua se firme margine interiore paralleliter attinentia. Petala oblique oblonga purpurea 3 mm. longa  $1\frac{1}{2}$  mm. lata apice obtuse acuta basi truncata non contracta  $1\frac{1}{2}$  mm. lata margine anteriore subrecta margine posteriore rotundata, margine tota longe ciliata, ciliis  $\frac{1}{2}$  mm. longis. Labellum cornuforme  $2\frac{1}{2}$  mm. longum utroque latere basi auriculis instructum crassum medio profunde sulcatum atropurpureum. Columna subrecta vel  $\pm$  recurva  $1\frac{1}{2}$  mm. longa antice leviter et tenuiter 2-alata, alis apice ad cornua



linearia 1 mm. longa productis, pede angulo recto recurvo circ. 3 mm. longo, parte inferiore cum petalis et sepalis connata, parte superiore libera sursum recurva, apice cum labello articulado.

HAB. Formosa; loco non indicato, cult. in seminario Taihoku.

**Bulbophyllum omerandrum** HAYATA sp. nov. = *Cirrhopetalum omerandrum* HAYATA. Rhizoma in arbores repens teres  $1\frac{1}{2}$  mm. in diametro vaginis scariosis obtectum. Pseudobulbi elongato-ovati 13 mm. longi 6 mm. lati apice  $\pm$  attenuati reliquis fibrosis vaginalium obtecti. Folia lineari-oblonga  $6\frac{1}{2}$  cm. longa 12 mm. lata apice obtusissima ad centrum retusa crassa in exsiccato coriacea, venis lateralibus parallelis utraque pagine leviter elevatis, basi subito in petiolum attenuata, petiolis 8 mm. longis intus profunde sulcatis. Scapi circ. 10 cm. longi basi vaginis scariosis instructi, vaginis 10–12 mm. longis ore obliquis, apice flores 2–3 racemosim gerentes, bracteis sub pedicello plicato-concavis 1 cm. longis, pedicellis 17 mm. longis. Flores subfulvescentes, petalis apice purpurascens, labello flavescenti. Sepalum posticum ovatum 13 mm. longum  $6\frac{1}{2}$  mm. latum 5-nervium apice obtusum ad summum cilio uno 2 mm. longo instructum basi non contractum 6 mm. latum margine sub lente minute crenulatum, lateralia oblique ovato-lanceolato-linearia 2 cm. longa 5 mm. lata apice obtusa basi plus minus contracta 5-nervia. Petala oblique oblonga 6 mm. longa 3 mm. lata apice obtusissima basi non contracta margine fimbriato-ciliata 3-nervia. Labellum liguliforme 7 mm. longum basi 2 mm. crassum. Columna brevissima 3 mm. longa antice subalata, alis apice ad cornua unguiformia productis, pede columnæ 5 mm. longo superne recurvo. Anthera apice pectinato-ciliata.

HAB. Mt. Arisan: Heishana, 6000 ped. alt., leg. B. HAYATA et TAKEO ITÔ, 1914, Mai.

Remarkable for the pectinately ciliate anthers.

**Bulbophyllum uraiense** HAYATA sp. nov. (Tab. XI.) Rhizoma teres 4 mm. in diametro. Pseudobulbi ampulliformes  $2\frac{1}{2}$  cm. longi 8 mm. lati apice  $\pm$  attenuati ad summum truncati reliquis squamarum obtecti. Folia crassa oblonga vel oblongo-linearia 10 cm. longa  $4\frac{1}{2}$  cm. lata apice rotundata vel obtusa basi subito acuta attenuata ad petiolum  $2\frac{1}{2}$  cm. longum abeuntia in exsiccato coriacea, venis lateralibus parallelis utraque pagine

(in exsiccato) tenuiter elevatis, petiolis intus profunde sulcatis. Scapi folio longiores 16 cm. longi basi approximativim imbricativim squamosi, sursum remotissime squamati vel haud squamati, apice flores 5–10 umbellativim gerentes, pedicellis 1 cm. longis basi bracteis 5 mm. longis lanceolatis scariosis instructis. Sepalum posticum ovato-lanceolatum 2 cm. longum 5 mm. latum valde concavum sursum lineari-acuminatum 5–nerviū basi  $\pm$  contractum 2 mm. latum margine integrum; lateralia lineari-lanceolata 5 cm. longa 3 mm. lata basi cum pede columnæ connata a medio sursum convoluta lineari-filiformia subteretia. Petala oblique recurvato-oblonga 6 mm. longa 3 mm. lata apice obtusa margine superiore convexa recurva margine inferiore concava recurva integra 3–nervia apice ad centrum mucronata. Labellum lineare valde recurvum 4 mm. longum 2 mm. crassum. Columna brevissima 1 mm. longa antice 2–alata, alis apice ad cornua linearia 2 mm. longa apice obtusa productis, pede apice libero cum labello articulatū.

*Cirrhopetalum uraiense* HAYATA in sched. herb. Taihoku.

HAB. Urai, leg. B. HAYATA et S. SASAKI, Juni. 1912.

Near *Cirrhopetalum boninense* MAKINO in Sōmokuzusetsu XVIII. t. 20.

**Bulbophyllum viridiflorum** HAYATA (Fig. 20) Ic. Pl. Formos. II. p. 133. Epiphyta, pseudobulbis ovoideis 2 cm. longis 1 cm. latis 1-foliatis. Folia crassiuscula solitaria elongato-oblonga 3–5 cm. longa 10–12 mm. lata apice obtusa ad centrum acuta basi contracta ad petiolum 5 mm. longum abeuntia supra viridia ad costas impressa, subtus elevata pallidiora. Scapi sub pseudobulbo, aphylli 6 cm. longi descendenti-recurvi basi 2–3-vaginati (vaginis imbricatis 7 mm. longis apice plus minus dilatatis ore obliquis) inferiore 1-vaginati, (vaginis dilatatis 12 mm. longis 8 mm. latis basi contractis apice dorso cuspidato-acutis,) uniflorati apice gradatim ad ovarium abeuntes. Flores solitarii apertientes 5 cm. in diametro pallido-viridescens. Sepala valde inæqualia, posticum oblongo-ovatum 28 mm. longum 14 mm. latum apice obtusum basi leviter contractum 5 mm. latum 7–nerviū, lateralia valde obliqua ovata 23 mm. longa 18 mm. lata apice obtusa basi leviter contracta cum pede columnæ connata mentum 1 cm. longum fornantia 9–nervia. Petala cum sepalo postico conformia minora 23 mm. longa 11 mm. lata apice subacuta vel obtusa basi leviter contracta 5–nervia. Labellum basi erectum a medio recurvato-patens 15 mm. longum totiusque latum inferiore latere

membranaceum a medio sursum spongioso-crassum rugosum medio 1-sulcatum apice viridescens minute rubro-punctatum apice subacutum vel obtusum margine

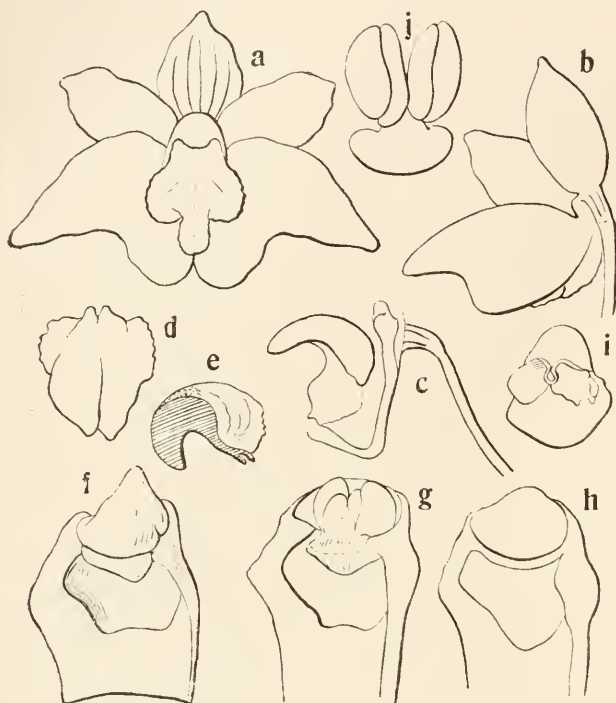


Fig. 20, *Bulbophyllum viridiflorum* HAYATA; a, a flower, seen from front; b, the same, seen from side; c, the same, sepals and petals taken off, column, mentum and labellum are seen; d, a labellum, seen from front, basal appendages are seen; e, the same, seen from side, medially cut, section-face shaded, minute red dots mentioned at the apex, basal appendages and claw are seen; f, column; g, the same, operculum taken off, 4 pollinia and translucent body seen; h, the same, anther taken off, clinandrium and stigma are seen; i, an operculum, seen from below; j, pollinarium.

Flowered in May in a green house of the Koishikawa Garden, in February, 1912. It was brought back to the Garden by myself from Mt. Arisan. It was found on a large trunk of a *Quercus* at Nimandaira. Very distinct for the comparatively large flowers of greenish colour.

*Ione* LINDL.

**Ione Sasakii** HAYATA (Fig. 21) Ic. Pl. Formos. II. p. 139. Epiphyta,

inferiore eroso-denticulatum sursum integrum basi appendiculatum, appendiculis retrorsis brevissimis 2-lobatis, brevissime unguiculatum cum pede columnæ articulatam. Columna brevissima vel nulla basi ad pedem producta, pede 2 cm. longo 4 mm. lato a basi usque ad medium cum sepalis connato, sed a medio sursum libero angulo 90° inflexo apice leviter concavo ad summum contracto cum ungue labelli articulatam. Pollinia 4 sessilia. Ovarium breve 6 mm. longum.

HAB. Mt. Arisan, leg. B. HAYATA et S. SASAKI Jan., 1912.

rhizomate repenti tereti  $1\frac{1}{2}$  mm. in diametro sectionis, pseudobulbis remotis elongato-ovoideis 1 cm. longis 3–4 mm. latis apice attenuatis basi contractis 1-foliatis. Folia solitaria oblongo-linearia 5 cm. longa 7 mm. lata apice rotundata ad centrum emarginata vel breve 2-lobata basi attenuata cum bulbis articulata crassiuscula. Flores racemosi, racemis sub pseudobulbo sitis paucifloratis 3 cm. longis nodosis, interdodiis 5 mm. longis ad nodos 1-vaginat, vaginis inferioribus 1 cm. longis tubuliformibus, superioribus laminatis, laminis apice acuminatis, sub floris singulis 1-bracteatis, bracteis ovatis 1 cm. longis 5 mm. latis apice acuminatis vel acutis basi leviter contractis, pedicellis (cum ovariis) 1 cm. longis. Flores patentes. Sepala subaequalia elongato-

triangularia vel elongato-ovata, posticum 10 mm. longum  $4\frac{1}{2}$  mm. latum apice acutum vel acuminatum basi contractum 5-nervium, lateralia angustiora et longiora quam iis posticis 11 mm. longa 4 mm. lata apice acuminata basi cum pede columnae connata

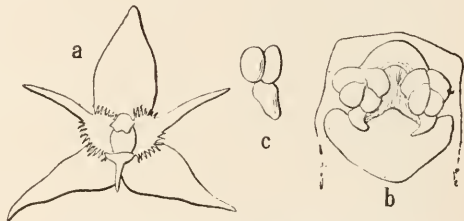


Fig. 21, *Ione Sasakii* HAYATA; a, a flower; b, a column; c, a pollinarium.

latere superiore basi angularia (angulis acutis), latere inferiore basi rotundata. Petala elongato-cuspidato-triangularia 7–8 mm. longa basi latissima 3 mm. lata non contracta apice lineari-cuspidata, (cuspidibus linearibus crassiusculis) margine inferiore denticulato-ciliata. Labellum cuspidato-rotundatum 5 mm. longum 3 mm. latum apice longe cuspidatum, (cuspidibus linearibus 4 mm. longis), basi abrupte contractum cum pede columnae articulatam 3-nervium valde concavum basi ad medium 2-lamellato-appendiculatum. Columna fere nulla, basi in pedem  $2\frac{1}{2}$ –3 mm. longum producta, pede cum sepalis lateralibus mentum formanti.

HAB. Mt. Arisan, leg. B. HAYATA et S. SASAKI, Jan., 1912.

Near *I. intermedia* KING et PANTLING, in Ann. Roy. Bot. Gard. Calc. VIII. t. 210; but differs by much acuminate or even caudate segments of the perianth. It was collected and sent to me by Mr. S. SASAKI with flowers preserved in alcohol, upon which the above description is based. It was also collected by myself, in January, this year, in the woods near Nimandaira in Mt. Arisan and was brought



back to the Koishikawa Garden where it flowered, in August, 1912, in open air. Sketches are drawn from living specimens.

***Eria* LINDL.**

***Eria arisanensis* HAYATA** sp. nov. (Tab. XII.) Rhizoma in arbores repens. Pseudobulbi secus rhizoma approximativ siti elongato-ovati plus minus recurvi  $1\frac{1}{2}$ –2 cm. longi 5–7 mm. in diametro apice 2-foliati. Folia 2 ad apicem pseudobulbi sita oblongo-linearia 5 cm. longa 1 cm. lata apice obtusa basi angustata ad insertionem 4 mm. lata in exsicco chartacea. Racemi ad apicem pseudobulbi siti 5 cm. longi 4–5 flori fusco-tomentosi, bracteis lanceolato-ovatis 8 mm. longis  $3\frac{1}{2}$  mm. latis apice acuminatis, pedicellis cum ovariis 8 mm. longis brevis hirsutis. Sepalum posticum lanceolatum 10 mm. longum 3 mm. latum apice acuminatum basi plus minus contractum margine interiore recurvum 5-nervi, lateralia obliqua falcato-oblongo-triangularia 10 cm. longa basi latissima 5 mm. lata cum pede columnæ mentum 5 mm. longum formantia falcato-recurva 5-nervia. Petala lanceolata 3-nervia 10 mm. longa 2 mm. lata apice acuta basi non contracta. Labellum obovato-spathulatum 11 mm. longum 6 mm. latum apice rotundatum vel leviter emarginatum basi attenuato-cuneatum apice 3-lobatum, lobis lateralibus oblongo-triangularibus 2 mm. longis  $1\frac{1}{2}$  mm. latis apice obtusis, versus centrum falcatis, lobo centrali rotundato 3 mm. longo totiusque lato crassiusculo botryoideo-tuberculato. Discus a medio usque ad basin labelli situs 2–3-lamellatus. Columna 3 mm. longa basi ad pedem 5 mm. longum producta.

HAB. in monte Arisan, leg. B. HAYATA et S. SASAKI, Jan., 1912. Fl. in horto botanico Tōkyō.

Very near *Eria reptans* MK. (*Eria japonica* MAX.); but distinguishable from it in many points.

***Eria hypomelana* HAYATA** sp. nov. (Fig. 22). Epiphyta. Pseudobulbi ovato-cylindrico-fusiformes 3 cm. longi 7 mm. lati squamis scariosis ovatis obtekti sursum approximativ 3–4-foliati. Folia oblanceolata vel lanceolata  $8\frac{1}{2}$  cm. longa 1 cm. lata coriacea viridia nitida apice acuminata basi longe attenuata ad extremitatem dilatata 5 mm. lata. Racemi ad axillas foliorum superiorum 6 cm. longi, pedunculis 2 cm. longis, floribus laxiuscule dispositis a se 1 cm. remotis, rhachibus tomentosis, bracteis tomentosis ovatis 1



cm. longis 5 mm. latis apice acutis margine minute denticulatis, pedicellis 8 mm. longis, ovariis 6 mm. longis tomentosis. Flores cinereo-viridi-flavi, purpureo-striati semiclausii non patentes. Sepalum posticum oblongum 11 mm. longum 4 mm. latum basi leviter contractum apice obtusissimum 5-nervium 5-purpureo-striatum; lateralia oblique oblongo-triangularia 11 mm. longa basi latissima 6 mm. lata apice obtusissima basi latissima basi pede columnæ connata 5-nervia purpureo-striata. Petala oblongo-lanceolata 9 mm. longa 3 mm. lata apice obtusa basi contracta 3-nervia purpureo-striata.

Labellum in circumscriptione obovatum 9 mm. longum in explicatio 6 mm. latum apice truncato-emarginatum basi cuneato-contractum 3-lobatum, lobis lateralibus semi-

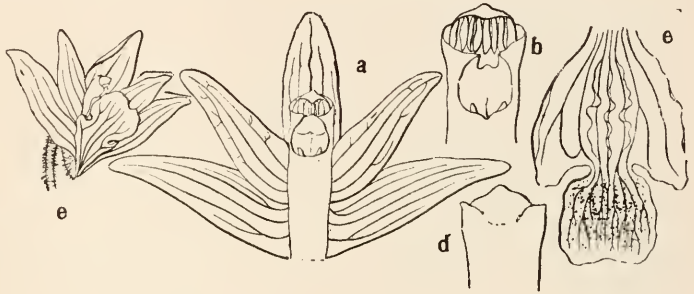


Fig. 22, *Eria hypomelana* HAYATA; e a, flower; a, a flower, explicated, lip taken off; c, a lip; b, upper portion of a column; d, the same, seen from back.

oblongis 5 mm. longis 2 mm. latis erectis columnam subamplectantibus, lobo terminali late subreniformi 3 mm. longo 4 mm. lato apice emarginato basi contracto ad basin  $2\frac{1}{2}$  mm. lato crassiusculo botryoideo-tuberculato, sinibus inter lobum terminalem et lobos laterales obtusis axe labelli transverse sitis. Discus ad medium labelli 2-lamellatus, lamellis 4-5 mm. longis. Labellum subtus nigro-atro-purpureum margine flavum, supra medium flavescens, lamellis discorum purpureis. Columna recta erecta 6 mm. longa 2 mm. lata subalata, pede 4 mm. longo 2 mm. lato.

HAB. Mt. Arisan, inter Funkiko et Taroyen, ad 5000 ped. alt., in arbores repens, leg. B. HAYATA et T. ITÔ, Mart., 1914.

Near *E. arisanensis* HAYATA, but differs from it in having much larger leaves, pseudobulbs and flowers.

***Eria plicatilabella* HAYATA sp. nov.** (Fig. 23). Caulis pauci-ramosus vaginatus, vaginis late cylindricis  $1\frac{1}{2}$  cm. longis 8 mm. latis apice obtusis vel

obtusissimis nervosis scariosis ore oblique truncatis imbricatis. Folia versus apicem caulis conferta lineari-lanceolata 18 cm. longa 18 mm. lata apice acuminato-attenuata ad summum obtuso-mucronata basi gradatim angustata supra basin leviter contracta ad basin  $\pm$  dilatata 9-nervia, nervis utraque pagine elevatis, basi cum petiolis articulata, petiolis brevissimis 3 mm. longis latis-  
simis caulem semi-amplexantibus. Racemi axillares 10 cm. longi ferrugineo-

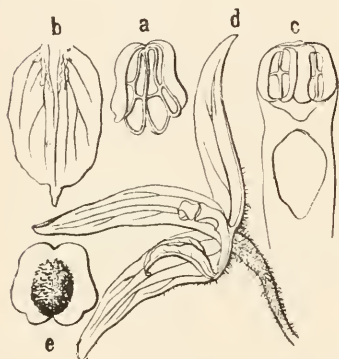


Fig. 23, *Eria plicatilabellu* HAYATA; a, a flower; b, a lip; c, a column; d, an operculum; e, the same seen from back.

tomentosis, bracteis ovatis apice acutis 6 mm. longis  $2\frac{1}{2}$  mm. latis reflexis subglabris, pedicellis brevissimis 2 mm. longis tomentosis, ovariis 3-4 mm. longis sursum latioribus tomentosis. Sepalum posticum oblongo-lanceolatum 7 mm. longum  $2\frac{1}{2}$  mm. latum apice obtusum basi non vel vix contractum 3-nerviū extus tomentosum intus glabrum, lateralia oblique oblonga 7 mm. longa  $2\frac{1}{2}$  vel 3 mm. lata apice obtusa basi pedicolumnæ adnata mentum 2 mm. longum for-  
mantia extus tomentosa intus glabra 3-nervia. Petala oblique lineari-lanceolata  $6\frac{1}{2}$  mm. longa 2 mm. lata 3-nervia glabra apice obtusa basi

vix contracta. Labellum oblongum  $3\frac{1}{2}$  mm. longum  $1\frac{1}{2}$  mm. latum apice cuspidatum glabrum margine minute ciliolatum dimidium inferius re erecto-plicatum dimidium superius descendento-plicatum apice cuspidatum basi auriculato-rotundatum ad extremitatem valde contractum ad contractionem  $\frac{1}{6}$  mm. latum. Columna 2 mm. longa  $\pm$  recurva basi ad pedem anteriore recurvum 2 mm. longum producta.

HAB. Formosa: loco non indicato, cult. in Taihoku seminario, leg. B. HAYATA, Mart., 1914, (fl).

Near *E. tomentiflora* HAYATA, but differs from it by the longer and thinner leaves, and by the much larger flowers.

***Eria septemlamella* HAYATA sp. nov.** (Fig. 24). Radices e basi pseudobulbi oriundæ incrassatæ. Pseudobulbi ellipsoidei 3-4 cm. longi 18 mm. lati squamis lanceolatis 2-5, 2-10 cm. longis obtecti. Folia 2 ad apicem

pseudobulbi sita oblanceolata circ. 30 cm. longa 5 cm. lata plus minus obliqua apice acuminata basi longe attenuata plicata basin scapi amplexantia in exsiccato membranacea, nervis et venis parallelis utraque pagine elevatis. Scapi 20 cm. longi, pedunculis 6 cm. longis, partibus floriferis 14 cm. longis racemosis densiuscule floriferis, floribus subdescendentibus, pedicellis (cum ovariis) 1 cm. longis, bracteis minutis. Sepalum posticum lineari-angustatum

12 mm. longum basi latissimum 3 mm. latum apice obtusum 3-5-nerviis, lateralia valde obliqua triangulari-oblonga desuper recurva 1 cm. longa basi latissima 6 mm. lata apice obtusa 5-nervia. Petala linearia  $\pm$  recurva 11 mm. longa 2 mm. lata 5-nervia apice obtusa. Labellum ad apicem pedis columnae articulatum ovato-rhomboidum 9 mm. longum 6 mm. latum subplicatum columnam semi-amplectans medio desuper recurvum basi cuneatum sursum 3-lobum, lobo



Fig. 24, *Eria septemlamella* HAYATA; a, a flower; b, the same, a lateral sepal taken off, to show the lip, mentum and column; c, a dorsal sepal; d, a lateral sepal; e, a petal; f, a lip; g, cross section of the same, to show the lamellate discs; h, a lamellate disc; i, apical portion of a column, anther lifted.

terminali oblongo-triangulari  $3\frac{1}{2}$  mm. longo 3 mm. lato apice obtuso facie lamellis 7 instructo, lamellis undulato-crispatis, mediis 3 mm. longis circ. 1 mm. latis, lobis lateralibus semi-oblongis erectis columnam semi-amplectantibus  $2\frac{1}{2}$  mm. longis vel latis. Disci 7-lamellati, lamellis a basi labelli usque ad basin lobi terminalis sitis 3 non crispatis. Columna 3 mm. longa, pede 5 mm. longo. Pollinia 8.

HAB. Rinkiho, 1911, Aug., leg. H. INABA.

Near *E. Corneri* REICHB. f., but differs from it by 7 lamellate discs on the terminal lobe of the lips; also near *E. fragrans* REICHB. f. (Ann. Roy. Bot. Gard. Calc. VIII. t. 168), but, distinguishable from it in having smaller flowers with lips with 7 lamellate discs.

*Phreatia* LINDL.

***Phreatia Morii* HAYATA sp. nov.** (Fig. 25). Epiphyta. Caulis foliatus basi pseudobulbosus 2-3 cm. longus basi 1 cm. latus basi squamis 1-2 involucratus. Folia ad apicem pseudobulbi gemina lanceolata 10 cm. longa 17 mm. lata apice obtusa basi plicatim attenuata cum vaginis articulata crassiuscula. Scapi a basi pseudobulbi oriundi 30 cm. longi graciles deorsum vaginati, partibus vaginatis 20 cm. longis, vaginis 13 mm. longis 3 mm. latis apice obliquis a se 4-5 cm. remotis scariosis, partibus floriferis 10 cm. longis spiciformibus densiuscule floratis, bracteis ovatis 5 mm. longis 2 mm. latis apice acutis, pedicellis subnullis, ovariiis  $2\frac{1}{2}$  cm. longis obovoideis apice truncatis basi attenuatis. Sepalum posticum triangulari-oblongum  $2\frac{1}{2}$  mm. longum

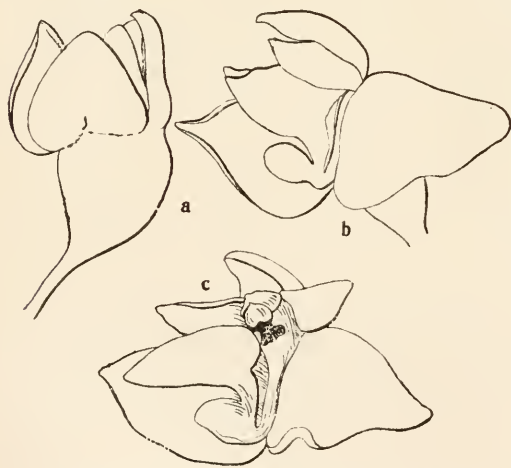


Fig. 25, *Phreatia Morii* HAYATA; a, a flower; b, the same, expanded; c, the same, petals expanded, showing the column, operculum, columnal foot and lip.

2 mm. latum apice obtusum basi latissimum valde concavum glabrum 1-nervium, lateralia oblique triangulari-oblonga concava 3 mm. longa basi latissime  $2\frac{1}{2}$  mm. lata apice obtusa 1-nervia glabra. Petala ovato-oblonga  $2\frac{1}{2}$  mm. longa  $1\frac{1}{2}$  mm. lata apice obtusa 1-nervia glabra. Label-lum erectum oblongo-triangulare 2 mm. longum  $1\frac{1}{3}$  mm. latum apice acutum basi abrupte truncato-contractum ad unguem  $\frac{1}{3}$  mm. longum totiusque latum abeums, ungue basi pede colum-

næ connato calcar breve sacciforme  $\frac{1}{3}$  mm. longum formanti. Columna subnulla  $\frac{1}{2}$  mm. longa basi in pedem circ. 2 mm. longum producta; dimidium



pedis cum sepalis lateralibus connatum, dimidium liberum apice cum basi unguis labelli connatum sacculum formans; rostellum 2-lobum, lobis acuminatis; anthera late triangulari-rotundata  $\frac{2}{3}$  mm. longa; pollinia 8.

HAB. Loco non indicato, leg. U. MORI, 1910.

Near *Phreatia nebularis*, *P. saccifera* and *P. elegans*; but it does not accord with neither in the shape of the leaves, pseudobulbs and flowers.

***Phajus* LOUR.**

***Phajus gracilis* HAYATA** (Fig. 26) Mater. Fl. Formos. p. 322. Caules 40–50 cm. longi, racemis a basi caulium emergentibus. Folia elongata plicata in petiolum longum contracta, laminis obovato-oblongis 20 cm. longis  $6\frac{1}{2}$  cm. latis apice obtuse acuminatis basi distincte contractis, petiolis 2–3 cm. longis basi vaginatis, vaginis 8 cm. longis striatis. Racemi cum pedunculis 30 cm. longi erecti graciles, partibus floriferis 8 cm. longis laxifloratis, bracteis oblongo-lanceolatis  $1\frac{1}{2}$  cm. longis, floribus majusculis  $3\frac{1}{2}$  cm. longis (præter ovarium). Sepala libera patentia, posticum angustatum  $3\frac{1}{2}$  cm. longum 1 cm. latum utrinque obtusum, lateralia postico breviora oblonga 3 cm. longa 1 cm. lata apice plicato-acuta basi obliqua latere inferiore obscure auriculata. Petala sepal opostico angustiora spathulata 3 cm. longa 6 mm. lata apice obtusa basi attenuata. Labellum erectum cucullatum 28 mm. longum 25 mm. latum (expanso) basi in calcar rectum 1 cm. longum productum 3-lobatum, lobis lateralibus amplis erectis columnam involventibus apice undulatis, lobo medio expanso latiore  $1\frac{1}{2}$  cm. lato 8 mm. longo patenti margine undulato apice emarginato-2-lobulato prope basin lamellato-tuberculato, lamellis medio incrassatis hirsutis cæterum glabris. Columna longiuscula 2 cm. longa 2-alata apice clavata, alis latioribus.

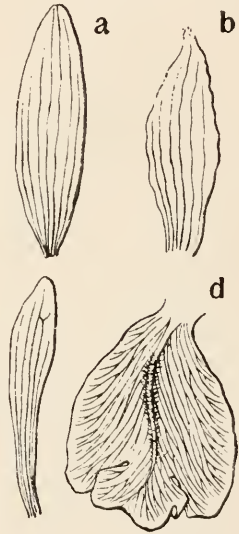


Fig. 26, *Phajus gracilis* HAYATA; a, a dorsal sepal; b, a lateral sepal; c, a petal; d, a lip.

HAB. Kōshūn: Botansha, leg. G. NAKAHARA, Dec. 1906, (No. 788).

***Phajus undulatomarginata* HAYATA** sp. nov. (Fig. 27.) Terrestres. Pseudobulbi ovato-fusiformes  $2\frac{1}{2}$ –3 cm. longi 8 mm. lati apice attenuati basi rotundati apice 2–3-foliati. Folia lanceolata 20 cm. longa  $3\frac{1}{2}$  cm. lata apice



acuminata basi attenuata ad petiolum vaginiformem abeuntia, nervis manifestis 3, exsiccato membranacea indigo-colorata, vaginis 10 cm. longis. Scapi

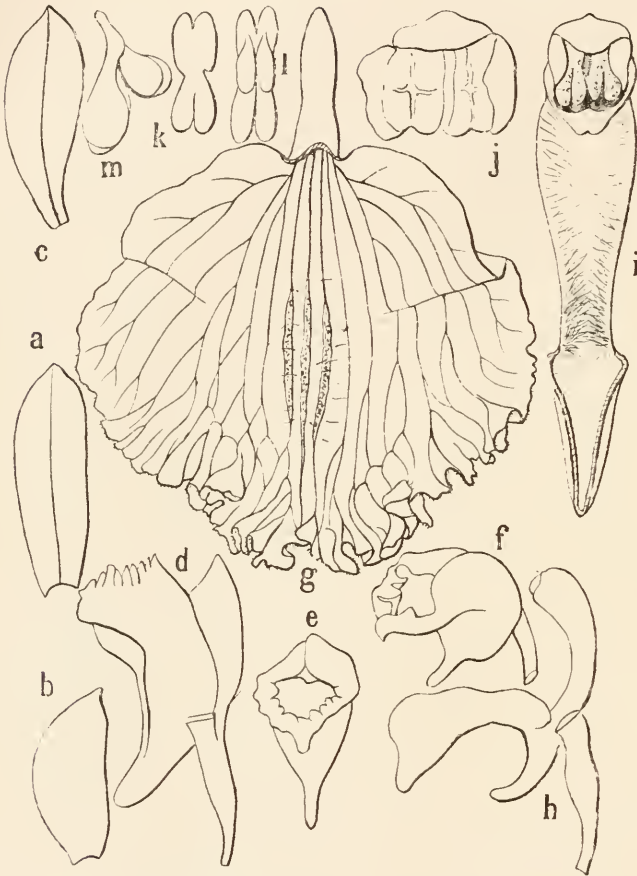


Fig 27, *Phajus undulatomarginata* HAYATA; a, a dorsal sepal; b, a lateral sepal; c, a petal; d, e, f, a lip, seen from different sides; g, a lip, unfolded; h, a column with a lip and spur; i, a column with a basal portion of a spur; j, an operculum lifted, seen from front; k, pollinia, seen from front; l, the same, seen from back; m, the same, seen from side; a—f, and h, nearly natural size; others variously magnified.

apophylli 25 cm. longi vaginati, vaginis 3 cm. longis 6–7 mm. latis apice acutis, partibus floriferis 8 cm. longis, bracteis obovatis  $1\frac{1}{2}$  cm. longis 1 cm. latis apice acuminatis basi amplexicaulibus. Sepalum posticum angustato-oblongum 3 cm. longum 1 cm. latum apice obtusum basi leviter contractum 4 mm. latum, lateralia postico latiora obliqua 12 mm. lata breviora  $2\frac{1}{2}$  cm. longa 7-nervia. Petala oblanceolata vel obovato-spathulata 3 cm. longa 1 cm. lata deorsum cuneato - attenuata ad basin 2 mm. lata 7-nervia. Label-

lum explicato late rotundatum  $2\frac{1}{2}$  cm. latum totiusque longum apice sub-emarginatum basi contractum, ad orem calcaris 3 mm. latum, lobis lateralibus amplis erectis semioblongis 2 cm. longis 8 mm. latis margine latera integris

non plicatis, margine anteriore valde plicato-undulatis ad lobum centralem gradatim abeuntibus lobo centrali brevissimo obscuro apice emarginato margine valde undulato-plicato, facie medio discis 3-5-striatis hirsutis instructum basi medio hirsutum calcaratum, calcar circ 8 mm. longo 2 mm. lato vel latiore intus hirsuto. Columna  $1\frac{1}{2}$  cm. longa 2 mm. lata 2-alata intus dense hirsuta. Rostellum validiusculum semirotundatum antice productum apice rotundatum.

HAB. Shintengai, leg. R. KANEHIRA, Mai., 1912.

Somewhat near *Phajus maculata* LINDL. (Ann. Roy. Bot. Gard. Calc. VIII. t. 149) in the shape of the lips which are undulately plicate at the margin, but greatly different from it in having much smaller form, lanceolate leaves with long petioles.

### *Tainia* BLUME.

***Tainia cordifolia*** HOOK. f. in HOOK. Ic. Pl. XIX. t. 1861; HAYATA et MATSUM. Enum. Pl. Formos. p. 410.

*Tainia Fauriei* SCHLECHT. FEDD. Rep. IX. 1911, p. 282.

HAB. in montibus Kussaku, leg. U. FAURIE, 1903 (No. 539).

SCHLECHTER's *Tainia Fauriei* is the same species as a plant mentioned in our work as *Tainia cordifolia* HOOK. f., as it was collected by the same collector at the same place and distributed with the same number. At Kew, I compared my plant with the type of this species, and found it to be identical with the same.

***Tainia unguiculata*** HAYATA sp. nov. (Fig. 28) = *Tainiopsis unguiculata* HAYATA in sched. Herb. Tōkyō. Radices incrassatæ; rhizoma subrepens ascendens ramosum teres in exsiccato 4 mm. in diametro, internodiis 7-10 mm. longis, ad nodos squamis unis instructis, squamis ovatis scariosis 3-4 cm. longis 2 cm. latis apice acuminatis basi rhizoma amplectantibus. Folia ad apicem rhizomatis rami solitaria longe petiolata lanceolata (duplicato-plicata) 25 cm. longa 6-7 cm. lata apice acuta vel acuminata basi longe attenuata 5-nervia, nervis parallelis, intra nervos 6-vena, venis parallelis, in exsiccato membranacea, petiolis 5 cm. longis apice cum laminis folii articulatis teretibus multisulcatis basi cum rhizomate articulatis. Scapi ad apicem rami rhizomatis solitarii vel gemini circ. 10 cm. longi vaginis scariosis ovatis obtekti, vaginis apice acuminatis 2-3 cm. longis quam internodio longioribus. Flores solitarii vel pauci-racemosi, bracteis ovatis

acuminatis  $2\frac{1}{2}$  cm.  
 longis alabastrum  
 floris amplexantibus,  
 pedicellis 5  
 mm. longis, ovariis  
 1 cm. longis lineari-  
 bus gracilibus  $\frac{1}{2}$   
 mm. in diametro  
 sulcatis. Flores  
 patentes 4 cm.  
 longi totiusque  
 lati. Sepalum pos-  
 ticum oblongo-  
 obovatum 23 mm.  
 longum 10 mm.  
 latum basi fere  
 laud contractum,  
 sepala lateralibus  
 magna oblique tri-  
 angularia latere  
 superiore 2 cm.  
 longa latere in-  
 feriore 3-4 cm.

longa basi  $2\frac{1}{2}$  cm. lata apice acuta basi cum pede columnæ connata mentum  
 2 cm. longum formantia, latere superiore libera, latere inferiore basi se con-  
 nata calcar 7 mm. longum 4 mm. latum formantia. Labellum ad orem  
 calcaris situm liberum longe unguiculatum, unguibus linearibus 9 mm. longis  
 4 mm. latis sursum ad laminam expansum, lamina cruriformi 3-lobata 2 cm.  
 lata  $1\frac{1}{2}$  cm. longa, lobo terminali triangulari-ovato 6 mm. longo 5 mm. lato  
 apice triangulari-acuto ad summum cuspidato-acuto basi leviter contracto ad  
 basin 3 mm. lato, lobis lateralibus divaricatis rectangulari-auriculiformibus  
 8 mm. latis totiusque longis. Discus medio labelli 1-lamellatus, lamella circ.  
 2 cm. longa crassiuscula. Columna circ. 10 mm. longa 2 mm. lata subalata

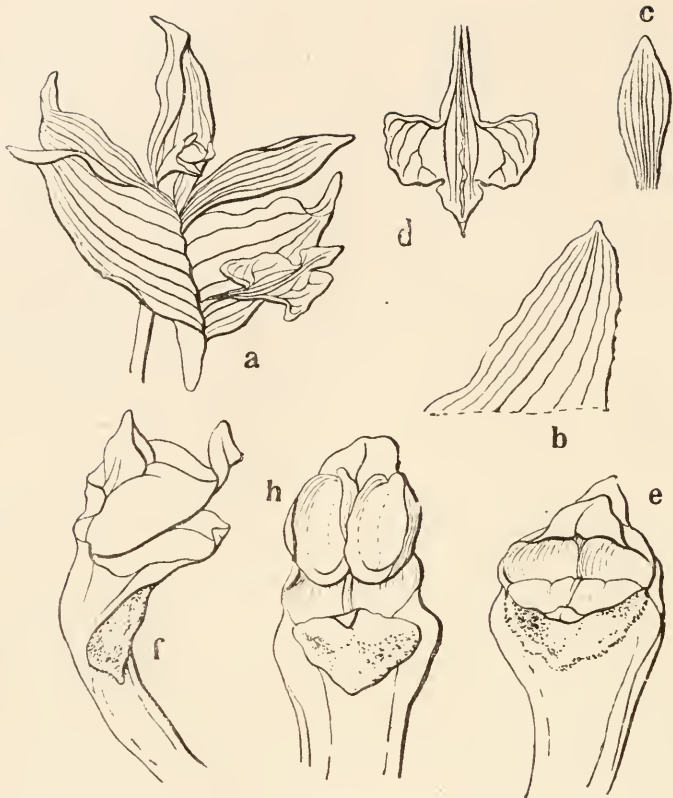


Fig. 28, *Tainia unguiculata* HAYATA; a, a flower, expanded; b, a detached lateral sepal; c, a petal; d, a lip; e, apical portion of a column; f, the same, seen from side; h, the same, seen from front, anther lifted;

apice dilatata circ.  $3\frac{1}{2}$  mm. lata nuda, basi in mentum  $2\frac{1}{2}$  cm. longum producta, stigmatibus triangularibus. Rostellum triangulare, latere clinandrii ultra insertionem antherarum productum. Anthera ovata 2-locularis cum appendice 4 mm. longa, appendice connectivi antice producto, sessilis dorso 2-cucullata.

HAB. Formosa: loco non indicato: cult. in seminario, Taihoku.

Near *Tainia cordifolia* Hook. f.; but differs by the much broader sepals, unguiculate lips, and much narrower lanceolate leaves.

It is with some hesitation that I have referred this plant to *Tainia*. It bears some resemblance to *Tainia* and *Acanthephippium* in its terrestrial habit, large membranous plicate petiolate leaves, few-large-flowered short lateral racemes, and in having lateral sepals adnating to the foot of the column, erect petals, footed column and 8 pollinia. Besides, it resembles the former more affirmatively by the long slender column with wings towards the apex and solitary leaves; while its affinity with the latter is more emphasized by the short lateral sheathed raceme, lateral sepals adnating to the long foot of the column to form a large pouch-like spurred mentum, mobile small stipitate lips with broad incurved lateral lobes and a small triangular terminal lobe, and long footed column. But it differs from *Tainia* on one hand by the short few flowered sheathed raceme, lateral sepals adnating to the long foot of the column to form a large pouch-like spurred mentum, mobile small stalked lip with broad incurved lateral lobes and a small triangular terminal lobe, and by long footed column; while on the other it is distinguishable from *Acanthephippium* by the long slender column winged towards the apex, solitary leaves, not fleshy flowers, and free sepals. Upon considering all the characters above mentioned, I am very much inclined to regard the plant as representing a new genus, *Tainiopsis*, just intermediate between the two named genera. What is rejected from one genus is accepted by the other, and *vice versa*. The two (*Tainia* and *Acanthephippium*) may be united to one and the same genus, when the characters which separate each other are connected by the one represented by this new orchid; or the three may be regarded as distinct. In my opinion, however, the new genus *Tainiopsis* should be regarded as a valid one, so long as the two (*Tainia* and *Acanthephippium*) should stand as distinct ones.



*Pleione* DON.

***Pleione formosana*** HAYATA Mater. Fl. Formos. p. 326. *Cœlogyne formosana* HAYATA in sched. herb. Taihoku. Descriptio auctata. Pseudobulbi ampullæformes apice rostrati cum rostris 3 cm. longi 17 mm. lati basi globosi, partibus globosis 17 mm. in diametro, partibus rostratis 1 cm. longis  $\frac{1}{2}$  cm. latis apice truncatis. Sepala petalæque purpureo-rosea. Labellum album versus discos maculatum. Pedunculi 20 cm. longi, fructus singulos gerentes. Capsula clavato-cylindrica  $\pm$  3 cm. longa 8 mm. lata apice abrupte truncata basi cuneato-attenuata 6-costata inter costas profunde sulcata, pedicellis 1 cm. longis.

HAB. Senninbora, in Mt. Arisan, ad 6000 ped. alt., leg. B. HAYATA et T. ITÔ, Mart., 1914.

*Pholidota* LINDL.

***Pholidota uraiensis*** HAYATA sp. nov. (Fig. 29) Rhizoma repens subteres 2 mm. in diametro, squamis scariosis dense obtectum, squamis 8-10 mm. longis deorsum vaginiformibus rhizoma complete amplexantibus apice acutis venosis se imbricatis. Pseudobulbi ascendentes 1-nodosi ovoidei apice truncato-obtusi basi rotundati  $\pm$  leviter tenuissime complanati 2 cm. longi 1 cm. lati basi squamis imbricatis in magnitudine variabilibus demum defectis dense obtecti vel basi reliquis squamarum instructi. Folia gemina terminalia ad apicem pseudobulbi sita lineari-oblancoolata 9 cm. longa .7 mm. lata deorsum gradatim attenuata ad petiolum  $1\frac{1}{2}$  mm. longum abeuntia ad apicem triangulari-obtusa vel obtuse mucronata, lamina subcoriacea supra plana margine desuper

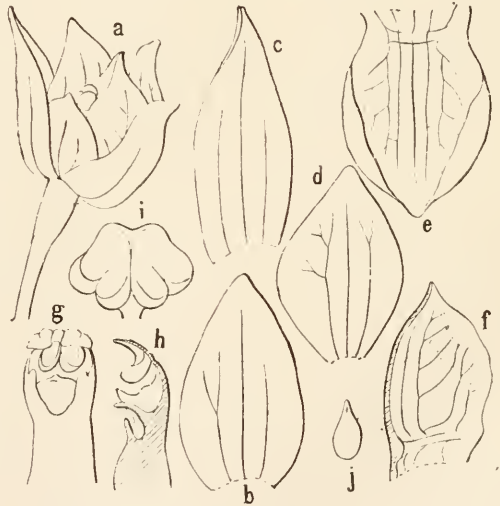


Fig. 29, *Pholidota uraiensis* HAYATA; a, a flower; b, a dorsal sepal; c, a lateral sepal; d, a petal; e, a lip; f, the same in vertical section; g, a column; h, the same, in section; i, an operculum, lifted up; j, a pollinium.



recurva ad costas subsulcata, nervis venisque utraque pagine non distinctis, petiolis haud distinctis cum pseudobulbo articulatis. Scapi vel racemi e basi pseudobulbi oriundi basi squamiferi 8 cm. longi sursum filiformes, parte florifera  $2\frac{1}{2}$ –3 cm. longa, bracteis ovatis  $4\frac{1}{2}$  mm. longis 4 mm. latis valde concavis subplicatis valde acutis 5–nerviis alabastrum floris amplectantibus caducissimis post anthesin deciduis, floribus subclausis vel subpatentibus 4 mm. longis densiusculis a se 2 mm. remotis, pedicellis ascendentibus 2 mm. longis, ovariis 1 mm. longis. Sepalum posticum ovatum  $4\frac{1}{4}$  mm. longum  $2\frac{3}{8}$  mm. latum apice angulato-obtusissimum basi vix contractum 2 mm. latum planum vel leviter concavum 3–nervium, nervis parallelis, margine integrum, lateralia obliqua ovata plicato-concava aequilonga cum postico, apice obtusa basi  $\pm$  contracta 3–nervia dorso manifeste ad costam carinata, carinis infra apicem acute productis. Petala late oblonga vel late obovata 4 mm. longa 3 mm. lata apice triangulari-obtusa basi cuneato-obtusa ad basin 1 mm. lata subplana 3–nervia, nervis parallelis. Labellum valde concavum in explicato late rotundatum 3 mm. longum  $4\frac{1}{2}$  mm. latum apice late rotundatum ad centrum breve obtuse cuspidatum, (cuspidibus triangularibus  $\frac{1}{2}$  mm. longis totiusque latis ad apicem obtusis), basi contractum prope basin disco transverso versus marginem valido, ad centrum tenui uno instructum basi ad pedem columnæ affixum. Columna 2 mm. longa subteres basi in pedem circ 1 mm. longum tumidum producta. Pollinia 4.

HAB. Uraisha, leg. S. SASAKI, Jan., 1913. Remarkable for its having scapes arising from the very base of the 1-noded pseudobulbs.

*Calanthe* R. BR.

***Calanthe arisanensis*** HAYATA Mater. Fl. Formos. p. 327.

HAB. Inter Funkiko-Taroyen, leg. B. HAYATA et T. ITÔ, Mart., 1914.

Note: Flowers nearly white, ovary slightly purple. Capsules elongato-obovoid  $3\frac{1}{2}$  cm. long  $1\frac{1}{2}$  cm. broad attenuate at the base, pedicels 1 cm. long.

***Calanthe brevicolumna*** HAYATA (Fig. 30) Mater. Fl. Formos. p. 328. Caulis brevis incrassatus 1–2-foliatus. Folia sessilia oblanceolata 35 cm. longa 8 cm. lata apice acuta basi attenuata. Scapi aphylli vel 1-foliati vel vaginati 70 cm. longi validiusculi, racemis densifloratis 10 cm. longis, bracteis ovatis

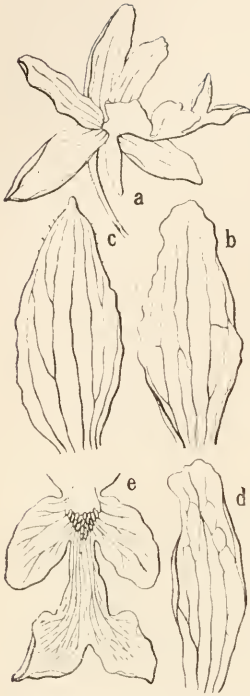


Fig. 30, *Calanthe brevicolumna* HAYATA; a, a flower; b, a uppermost sepal; c, a lateral sepal; d, a petal; e, a lip.

2 cm. longis 6 mm. latis. Flores mediocrini 2 cm. in diametro, pedicellis 5 mm. longis. Sepala æqualia erecto-patentia ovata 9 mm. longa 6 mm. lata apice obtusa basi contracta. Petala sepalis angustiora oblongo-angustata 1 cm. longa 3 mm. lata apice truncata basi angustata. Labellum sepalis longius, (unguis cum alis columnæ in tubum connatus, tubo late campanulato 3 mm. in diametro), ima basi in calcar 6 mm. longum  $1\frac{1}{2}$  mm. latum productum, calcar subrecto; lamina patens obovata in circumscriptione 8 mm. longa 5 mm. lata 3-lobata, lobo medio longiore 6 mm. longo apice divaricato-2-lobulato, (lobulis oblongo-truncatis), basi cuneato, lobis lateralibus minoribus oblique oblongis antice falcatis apice obtusis 3 mm. longis  $1\frac{1}{2}$  mm. latis; discus calloso-cristatus basi labelli 3-seriatim dispositus. Columna brevis 3 mm. longa. Clinandrium excavatum; rostellum 2-lobatum, lobis oblongis obtusis; anthera rotundata antice breve acuta. Pollinia 8 elongato-ovata apice acuminata, caudiculis brevissimis.

HAB. Taitō: Bataian, leg. T. KAWAKAMI, Aprili. 1907.

Near *C. herbacea* LINDL., but differs from it in having much shorter spurs, and in the lips, sepals, and in many other points.

***Calanthe caudatilabella* HAYATA sp. nov.** (Tab. XIII.) Pseudobulbi. . . . Folia 5-6 ex apice pseudobulbi oriunda lineari-lanceolata 20-30 cm. longa  $1-1\frac{1}{2}$  cm. lata, apice acuminata basi gradatim attenuata basi plicata in exsiccato membranacea, venis lateralibus parallelis, venis transversis tessellatis. Scapi 35 cm. longi sursum racemosi, partibus floriferis 15 cm. longis, bracteis ovato-lanceolatis apice acuminatis, floribus a se 1 cm. remotis. Sepalum posticum lanceolatum 2 cm. longum 5 mm. latum apice acuminatum basi leviter contractum, lateralia oblique lanceolata 23 mm. longa 5 mm. lata apice acuminata basi leviter contracta. Petala parva linearia 12 mm. longa 2 mm. lata apice

acuminata. Labelli lamina ovata 16 mm. longa 12 mm. lata apice breve caudata basi contracta a medio sursum 3-lobata, lobo terminali ovato circ. 1 cm. longo 6 mm. lato apice cuspidato-caudato basi contracto 4 mm. lato, lobis lateralibus late oblongis apice truncatis 4 mm. latis 3 mm. longis, margine irregulariter erenulato-denticulatum basi cum columna connatum, partibus connatis 5 mm. longis intus villosopilosis, pilis rectis, calcaribus linearibus 5 mm. longis 1 mm. in diametro desuper recurvatis. Discus basi laminae labelli situs 2-lamellatus. Columna brevis 4 mm. longa. Rostellum acutum apice 2-lobum, lobis acutis. Ovarium hirsutum 4 mm. longum, pedicello brevi.

HAB. Rinkihō: Gosarin, ad 7000 ped. alt., leg. H. INABA, Aug., 1912.

**Calanthe forsythiiflora** HAYATA sp. nov. (Tab. XIV.) Rhizoma erectum, radicibus incrassatis. Folia 4-3 fasciculata basi se involventia oblanceolata membranacea 40 cm. longa 6 cm. lata apice acuminata ad summum acuta basi gradatim attenuata, partibus attenuatis 13 cm. longis, nervis principalibus 5, inter nervos venis 12, venulis transversis tessellatis. Scapi e basi fasciculi foliorum oriundi 30-40 cm. longi aphylli vaginati, vaginis scariosis  $3\frac{1}{2}$  cm. longis 6 mm. in diametro apice acutis ore obliquissimis a se 8 cm. remotis, partibus floriferis 8 cm. longis flores flavos racemosim gerentibus, floribus a se 1 cm. remotis horizontaliter patentibus vel sub nutantibus subsecundum dispositis, bracteis valde caducis non visis, pedicellis (cum ovario 7 mm. longis) 4 mm. longis. Sepalum posticum obovatum 8 mm. longum 4 mm. latum apice acutum vel aristato-acutum basi  $\sqcap$ formiter insertum 3 mm. latum 3-5-nervium, lateralia oblique ovata vel obovata postico conformia. Petala tenuissima late ovata  $\pm$  obliqua 7 mm. longa 4-5 mm. lata apice subito acuta vel mucronato-acuta basi contracta  $1\frac{1}{2}$  mm. lata 3-nervia, nervis parallelis, valde concava. Labellum basi cum columna connatum, lamina late rotundato-reniformi  $3\frac{1}{2}$  mm. longa  $5\frac{1}{2}$  mm. lata apice late rotundata ad centrum emarginata ad medium partis emarginatae breve mucronata basi contracta 2 mm. lata basi utraque latere auriculis instructa, auriculis semirotundatis  $\frac{1}{2}$  mm. longis totiusque latis, multinervium basi medio discis 2 instructum, discis auriculiformibus  $\frac{1}{2}$  mm. longis  $\frac{1}{4}$  mm. latis lamelliformibus, calcaribus  $\pm$  recurvis  $3\frac{1}{2}$  mm. longis apice  $\pm$  dilatatis  $1\frac{1}{2}$  mm. in diametro. Columna 2 mm. longa; clinandrium concavum. Pollinia 8.

HAB. Kōshun, leg. T. KAWAKAMI et T. ITō, 1909, Juni.

Very near *C. Mannii* HOOK. fil. in Orch. Sikk. Himal. in Ann. Roy. Bot. Gard. Calc. VIII. t. 225, in its external appearance, but differs by the quite yellow flowers with quite different lips.

***Calanthe graciliflora*** HAYATA (Fig. 31) Mater. Fl. Formos. p. 329.

Folia 2-3 oblongo-spathulata cum vaginis 30 cm. longa 6½ cm. lata apice

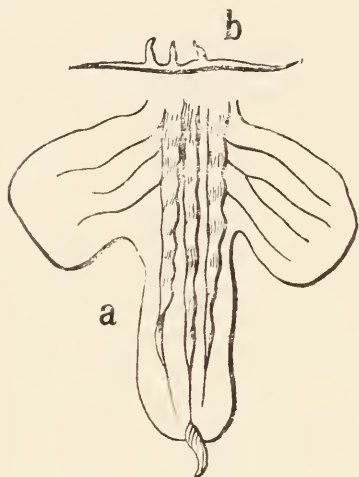


Fig. 31, *Calanthe graciliflora* HAYATA; a, a lip; b, section of a basal portion of the same.

acuminata basi gradatim attenuata ad vaginam abeuntia utrinque glabra plicato-plana. Scapi graciles 60 cm. longi, racemis laxifloratis, floribus medioeribus 3½ cm. in diametro, bracteis lanceolatis scariosis 1 cm. longis tenuibus, pedicellis gracilibus 1 cm. longis, petalis et sepalis valde postice reflexis, labello antice horizontaliter patenti. Sepala subæqualia oblongo-lanceolata 2 cm. longa 6 mm. lata apice aristato-acuminata basi leviter contracta 5-nervia extus breve hirtellata. Petala sepalis angustiora ob-lanceolata apice acuta basi attenuata 18 mm. longa 4 mm. lata 3-nervia. Labellum antice patens; unguis cum alis columnæ in tubum

connatus, tubo angusto (ore 2 mm. in diametro intus hirtellato) ima basi attenuato in calcar 12 mm. longum 1 mm. latum producto, calcari extus et intus hirtellato; lamina labelli rotundata in ambitu 1 cm. longa totiusque lata 3-lobata, lobo medio angusto 5 mm. longo 2 mm. lato apice emarginato-aristato, aristis 1 mm. longis desuper reflexis, lobis lateralibus quadrangulato-rotundatis 4 mm. longis totiusque latis oblique divaricatis; discus calloso-lamellatus, lamellis 3. Columna brevis 5 mm. longa clavata. Clinandrium excavatum, lobo posteriore truncato, anteriore (rostello) 2-lobato, lobis dentiformibus. Anthera opercularis incumbens, postice cordata antice acuminata 3 mm. longa distincte 2-locularis, loculis distincte 2-locellatis. Pollinia 8 subcomplanata elongato-ovata apice attenuata 1½ mm. longa caudiculis connata, caudiculis 1 mm. longis.



HAB. Nanō, Kimmonsia, ad 3200 ped. alt., Aprili. 1909, (No. 15), leg. U. MORI.

Near *C. Henryi* ROLFE., but differs from it by the much narrower leaves and by the lips with very much divaricate side-lobes which are inserted at nearly 90°. In the other species they are inserted at an acute angle and nearly as long as the middle lobe. Sepals and petals greenish red, rosaceous on the outer side, but greenish yellow on the inner; lips whitish; column light rose.

**Calanthe Kawakamii** HAYATA (Fig. 32) Mater. Fl. Formos. p. 330. Caulis brevis in pseudobulbum late globosum 1 cm. longum incrassatus basi vaginatus supra basin foliatus. Folia oblonga 20 cm. longa 9 cm. lata apice breve acuta basi abrupte ad vaginam contracta plicatoplane. Scapi 40–50 cm. longi graciles basifoliati vel aphylli vaginati, racemis laxe floratis, floribus breve pedicel latis, bracteis lanceolatis 1 cm. longis. Flores majusculi 3½ cm. longi, pedicellis 5 mm. longis. Sepala inæqualia extus brevissime hirtellata, posticum majus ovato-oblongum 33 mm. longum 15 mm. latum apice breve cuspidatoacutum basi contractum, lateralia angustiora oblongo-lanceolata 3 cm. longa 1 cm. lata apice obtuse acuminata basi angustata. Labelli unguis alis columnæ in tubum campanulatum (ore 5 mm. in diametro) connatus, ima basi in calcar 7 mm. longum rectum productus, lamina patens 2 cm. longa totiusque lata profunde 3-lobata, lobo medio obovato-oblongo 13 mm. longo 9 mm. lato apice emarginato ad sinus breve aristato basi angustato, lobis lateralibus divaricatis cultriformibus 1½ cm. longis 8 mm. latis apice rotundatis; discus 4-lamellatus, lamellis supra medium laminarum sitis, 2-lateralibus a medio deorsum intus dense pilosis. Columna lata brevis 8 mm. longa, alis cum ungue labelli connatis. Clinandrium profunde excavatum oblique truncatum, lobo anteriore (rostello) oblique erecto 2-lobato, lobis dentiformibus; anthera ad apicem membranarum posteriorum clinandrii affixa incumbens cordato-ovata apice obtuse

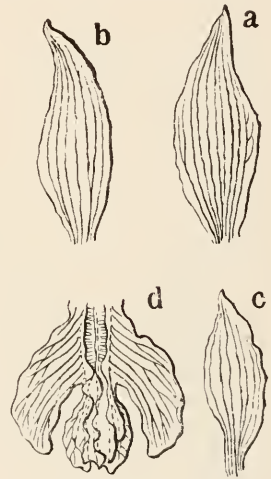


Fig. 32, *Calanthe Kawakamii* HAYATA; a, a dorsal sepal; b, a lateral sepal; c, a petal; d, a lip.



acuminata 7 mm. longa 4 mm. lata 2-ocularis. Pollinia 8, in singulo loculo 4, cerea oblonga plus minus complanata apice attenuata basi rotundata circ.  $2\frac{3}{4}$  mm. longa apice caudiculis connata, caudiculis filiformibus  $2\frac{1}{2}$  mm. longis.

HAB. Shintiku: Gakokeizan, leg. T. KAWAKAMI et K. WATANABE, Aprili. 1907.

**Calanthe lamellata** HAYATA sp. nov. (Fig. 33.) Caulis 20-30 cm. longus gracilis infra medium 2-3-foliatus sursum racemosus, racemis circ. 10 cm. longis. Folia 3-4 ovato-oblonga 15 cm. longa 6-7 cm. lata apice subito acuta basi attenuata sessilia caulem amplexantia margine integra vel leviter crispa, venis nervisque vena marginali connectis, bractee ovatae vel ovato-lanceolatae 7 mm. longae. Sepala subaequalia; posticum ovato-oblongum 23 mm. longum 10 mm. latum apice acutum basi plus minus contractum margine non recurvum 5-nervium, lateralia postico conformia. Petala ovato-

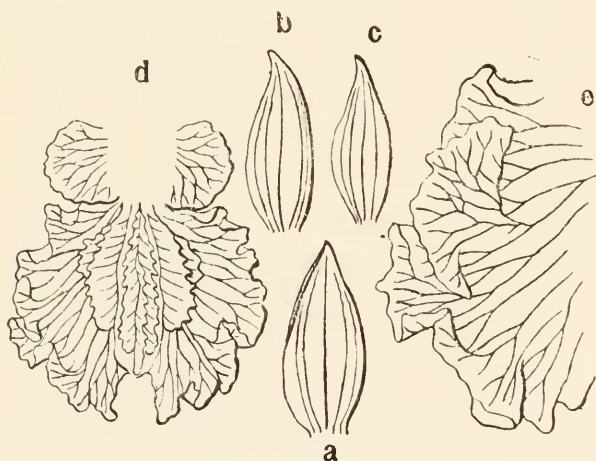


Fig. 33, *Calanthe lamellata* HAYATA; a, an uppermost sepal; b, a lateral sepal; c, a petal; d, labellum; e, margin of the same.

oblonga  $1\frac{1}{2}$  cm. longa 5 mm. lata apice acuta basi plus minus contracta 3-nervia vel obscure 5-nervia. Labellum ecalcaratum ob-ovatum 2 cm. longum totiusque latum apice profunde emarginatum vel leviter 2-lobum ad centrum apicis brevissime triangulare acutum vel mucronato-acutum basi contractum plus minus cordatum 3-lobum, lobis basilaribus (lateralibus) auriculiformibus 5 mm. longis totiusque latis vel quadrangularibus margine crenulatis, lobo terminali reniformi-rotundato  $1\frac{1}{2}$  cm. longo 2 cm. lato basi contracto 2 mm. lato apice leviter bilobato ad centrum apicis brevissime acuto margine valde undulato-plicato-crispato. Discus ad medium lobi terminalis situs longitudinaliter 3-5 lamellatus, lamellis circ. 1 cm. longis 2 mm. latis, margine crispatis. Columna brevis.

HAB. Mt. Rontabun, leg. U. MORI, Aprili. 1910.

Remarkable for the broadly lamellate discs and for the leaves with a marginal vein connecting all other veins. Very near *C. tricarinata* LINDL., (Ann. Roy. Bot. Gard. Calc. IX. t. 103), but differs from it by the slightly longer terminal lobes of the lips which are much more strongly undulately folded at the margin and by the leaves which have veins running towards the margin, and a marginal vein connecting all other veins.

***Calanthe reflexa* MAXIM. (Fig. 34).**

HAB. Formosa: loco non indicato: cult. in seminario Taihoku, leg. B. HAYATA, Aprili. 1914.

Compared with a specimen of the species in the Tōkyō herbarium.

Note: Flowers slightly yellow.

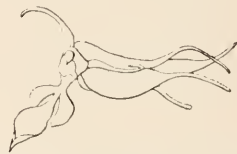


Fig. 34, *Calanthe reflexa* MAX., natural size.

***Calanthe Sasakii* HAYATA sp. nov. (Fig. 35.)** Caulis 30–50 cm. longus basi vaginatus, vaginis 5 cm. longis 1 cm. latis apice acutis scariosis nervosis. Folia sæpe gemina lanceolata 30–40 cm. longa 5 cm. lata apice acuta basi gradatim attenuata ad petiolum 10 cm. longum abeuntia in exsiccatō membranacea. Partes caulis floriferæ 10 cm. longæ laxiuscule floratæ, floribus a

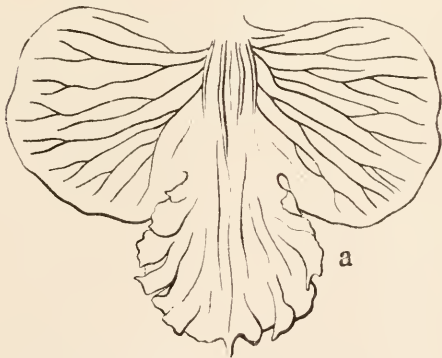


Fig. 35, *Calanthe Sasakii* HAYATA; a, a lip.

se 2 cm. remotis, pedicellis (cum ovariis)  $2\frac{1}{2}$  cm. longis gracillimis, bracteis ovato-lanceolatis 1 cm. longis. Flores 3 cm. in diametro. Sepala: posticum oblongo-lanceolatum 22 mm. longum 7 mm. latum apice acuminatum basi angustius  $2\frac{1}{2}$  mm. latum 5-nerviū margine  $\pm$  undulatum integrum; lateralia æquilonga obliqua apice acuminata. Petala lanceolata

sepalo breviora 18 mm. longa  $4\frac{1}{2}$  mm. lata apice acuminata basi 2 mm. lata 3-nervia. Labelli lamina sessilis basi calcarata flabelliformis basi  $\pm$  cordata 1 cm. longa  $1\frac{1}{2}$  cm. lata 3-lobata, lobo centrali 15 mm. longo 6 mm. lato apice emarginato ad centrum aristato margine valde plicato-crispato, lobis lateralibus lobo terminali latioribus margine subintegris  $\pm$  crispatis; calcar ab

apice usque ad laminam labelli 2 cm. longo apice subrecto acuto. Discus basi laminæ 3-striatim dispositus obscurus. Columna 5 mm. longa  $\pm$  dorso recurva.

HAB. Akō, Mt. Buyesan, leg. S. SASAKI, Mart., 1910.

*Eulophia* R. BR.

***Eulophia brachycentra* HAYATA** sp. nov. (Fig. 36, a) Fasciculi foliorum basi vaginati, vaginis 3-4, 10-20 cm. longis inferiore cylindraceis superiore lanceolatis. Folia 3-4-fasciculata lineari-lanceolata circ. 50 cm. longa 12 mm. lata apice acuminata basi gradatim attenuata inferiore prope basin vaginata se amplectantia supra minute elevato-venulosa subtus prominente 3-nervia, nervis elevatis, minute venulosa. Scapi (racemi) 75 cm. longi folia multo

superantes, parte non florifera 62 cm. longa ad nodos vaginata, vaginis cylindraceis 10 cm. longis sursum lanceolatis acuminatis, parte florifera 10-13 cm. longa densiuscule florata, floribus a se 1 cm. remotis, bracteis glabris lanceolatis 1 cm. longis apice acuminatis, pedicellis cum ovariis 15-20 mm. longis, floribus apertientibus 25 mm. in diametro, sepalis petalisque patentissimis. Sepalum posticum obovato-oblongum 13 mm. longum 6 mm. latum apice obtusum ad summum apiculatum, (apiculo desuper recurvo), basi  $\pm$  contractum 2 mm. latum 7-9-nerviium margine planum prope apicem interiore recurvum glabrum, lateralia cum postico conformia  $\pm$  obliqua. Petala oblonga sepalo postico latiora 13 mm. longa 7-8 mm. lata apice obtusissima basi contracta obtusissima 2 mm. lata 7-nervia. Labellum erecto-patens late obovatum  $1\frac{1}{2}$  cm. longum 14 mm. latum glabrum basi subcalcaratum vel menti-forme (mento 4 mm. longo) 3-lobatum, lobis lateralibus (basilaribus) semi-oblongis apice rotundatis 3-4 mm. latis



Fig. 36, a, *Eulophia brachycentra* HAYATA; b-h, *Eulophia ramosa* HAYATA; b, a flower; c, a dorsal sepal; d, a lateral sepal; e, a petal; f, a lip; g, a column, seen from front; h, the same, seen from side; b, natural size, others more or less magnified.

suberectis margine integris, lobo terminali oblongo 7-8 mm. longo 7 mm. lato apice perfecte rotundato basi non contracto margine sursum undulato plicato. Discus

a prope apicem ad supra basin situs 5-striato-lamellatus, lamellis sursum convergentibus crassiusculis crispatis medio tenuissimis vel ad nullum reductis evanescentibus deorsum prominentibus latioribus, partibus latioribus circ. 1 mm. latis. Columna 8 mm. longa semiteres  $\smile$ -formis in sectione subapoda? Pollinia 2 globosa, stipite lineari  $1\frac{1}{2}$  mm. longo  $\frac{1}{3}$  mm. lato.

HAB. Taitō: Shinkōgai, leg. Z. KOBAYASHI, Juni., 1906, fl.

Near *Eulophia herbacea* LINDL. (Ann. Roy. Bot. Gard. Calc. XI. part-2, t. 106.), but differs from it by the narrower leaves, lamellate discs, undulate margins of the lips and by many other points.

***Eulophia ramosa*** HAYATA (Fig. 35, b-h), Mater. Fl. Formos. p. 332. Caulis circ. 50 cm. longus glaber angulatus striatus basi squamatus, (squamis amplexicaulibus ovatis acutis 15 mm. longis), superiore racemosus. Folia (KAWAKAMI, No. 6281) inferiora lanceolato-linearia 20 cm. longa 6 mm. lata basi amplexicaulia ad vaginam attenuata, superiora minora linearia 3-6 cm. longa amplexicaulia plicata. Racemi 20-25 cm. longi pauci-ramosi, ramis gracilibus erectis. Flores erecto-ascendentes 15 mm. longi, pedicellis cum ovario 15 mm. longis, bracteis ovatis acuminatis pedicellum amplexantibus 7 mm. longis. Sepala æquiformia lanceolato-angustata 12 mm. longa  $2\frac{1}{2}$  mm. lata apice acuta basi leviter angustata erecta. Petala sepalis latiora plus minus breviora 11 mm. longa  $3\frac{1}{2}$  mm. lata lanceolato-obovata apice acuta erecta. Labellum a basi columnæ erectum obovatum sepalum in longitudine æquans 11 mm. longum 8 mm. latum, inter sepala lateralia in calcar gibbosum 2 mm. longum ad apicem leviter contractum productum, supra basin contractum 3-lobatum, lobis lateralibus erectis columnam amplexantibus latissimis margine latere integris antice eroso-denticulatis apice obtusis, lobo centrali patenti globoso-obovato 4 mm. longo 5 mm. lato apice rotundato-truncato basi leviter contracto ad basin 3 mm. lato. Discus medio a basi labellorum usque ad medium 3-lamellatus, (lamellis utrinque ramosis), etiamque ad paginam lobi centralis a medio usque ad prope apicem fimbriato-cristatus. Columna brevis crassa apoda sæpius 2-alata. Ovarium cylindricum sulcatum 6 mm. longum.

HAB. Nōkōzan, leg. T. KAWAKAMI et U. MORI, 1908, Jan. (No. 6281).

The present species is near *E. taiwanensis* HAYATA, from which it differs in having branched inflorescence and smaller flowers with slightly denticulate lips.



*Cymbidium* Sw.

**Cymbidium albo-jucundissimum** HAYATA sp. nov. Pseudobulbi annotini conico-ovati 6 cm. longi  $2\frac{1}{2}$  cm. lati infra medium latissimi subcomplanati circ. 4-nodosi, internodiis longioribus  $1\frac{1}{2}$  cm. longis, brevioribus 8 mm. longis. Folia lanceolata 30 cm. longa 22 mm. lata apice acuminata basi cum petiolis articulata supra nitida viridia subtus opaca margine sub lente suberosa, costis subtus acuto-elevatis, nervis lateralibus principalibus utroque latere costae 2, crasso-coriacea, petiolis 2 cm. longis subplicatis in explicato 12 mm. latis. Scapi vel racemi 30 cm. longi. Flores apertientes 4 cm. in diametro, pedicellis cum ovariis 12 mm. longis, albescentes. Sepalum posticum obovato-lineari-lanceolatum 23 mm. longum 4 mm. latum apice acuminatum basi vix contractum 2 mm. latum 5-nervium planum margine integrum planum, lateralia cum postico conformia. Petala ovato-lanceolata 2 cm. longa 5 mm. lata apice acuta basi obtusa 5-nervia margine interiore recurva basi 1 mm. lata. Labellum ovatum  $1\frac{1}{2}$  cm. longum 11 mm. latum, hypochilo 8 mm. longo 11 mm. lato rotundato erecto basi rotundato-contracto  $2\frac{1}{2}$  mm. lato facie glabro medio disco 2-lamellato instructo, lamellis subadnatis ( )-formiter dispositis, latere erecto, epichilo desuper recurvo oblongo facie dense brevissime muricato-hirtello 8 mm. longo 7 mm. lato apice obtusissimo ad summum brevissime triangulare apiculato vel non apiculato sursum prope apicem margine interiore subrecurvo. Columna 12 mm. longa 3- $3\frac{1}{2}$  mm. lata complanato-semiteres subalata.

HAB. Formosa: loco non indicato: cult. in seminario Taihoku, leg. B. HAYATA, 1914, Mart.

Near *C. sinense* WILLD., but differs from it by the smaller nearly white flowers, in the maculation of the lips and in more hirsute terminal lobe of the latter.

**Cymbidium aloifolium** SWARTZ (Fig. 37, et 38-a); Orch. Sikkim Himal. in Ann. Roy. Bot. Gard. Calc. VIII. t. 252.

HAB. Formosa: loco non indicato, cult. in seminario Taihoku, leg. T. SÔMA, Aug. 1913, (fl.).

Columnal foot is more conspicuous in our plant than in the figure in the above mentioned work. The following description is drawn from our specimens.

OBSERV. Folia crassa linearia 30-60 cm. longa  $1\frac{1}{2}$  cm. lata in vivo supra



nitida viridissima, venis non visis, ad costam tenuiter sulcata subtus pallidiora, costis elevatis, margine desuper recurva apice inæqualiter emarginata vel inæqualiter 2-loba, (lobo longiore 2 mm. longo 7 mm. lato apice rotundato, lobo brevior sub-nullo), basi non angustata plicata cum vaginis articulata. Scapi vel racemi penduli 32 cm. longi, partibus basilaribus non floriferis 8 cm. longis, partibus floriferis 24 cm. longis, floribus a se 4 cm. remotis, bracteis lanceolatis 2 cm. longis pedicellum vix superantibus, pedicellis cum ovariis 2 cm. longis patentibus gracilibus glabris. Flores 3-4 cm. in diametro, sepalis valde reflexo-retrorsis, labello suberecto. Sepalum posticum lineari-lanceolatum 2 cm. longum apice acutum basi vix vel haud angustius  $2\frac{1}{2}$  mm. latum supra medium latissimum  $4\frac{1}{2}$  mm. latum 5-nervium margine valde reflexum convexum, lateralia cum postico æquilonga vix latiora 5 mm. longa  $\pm$  obliqua 6-nervia margine valde reflexa. Petala oblanceolata



Fig. 37, *Cymbidium aloifolium* SWARTZ.  $\times \frac{1}{4}$ ; photographed by Mr. T. SŌMA.

2 cm. longa 6 mm. lata apice acuta basi gradatim angustata basi 2 mm. lata margine valde exteriori recurva erecta 6-nervia  $\pm$  obliqua. Labellum

crassiusculum ad marginem tenue late oblongum 16 mm. longum 12 mm. latum apice truncatum ad centrum breve triangulare apiculatum, apiculis  $\frac{1}{2}$  mm. latis  $\frac{1}{4}$  mm. longis, vel retusum basi contractum facie supra brevissime villosum subtus glabrum, hypochilo erecto basi  $\pm$  saccato medio discis 4 tuberculato-elevatis  $\diamond$ -formiter dispositis, epichilo desuper recurvo patenti, lobis lateralibus (hypochili) lineari-oblongis  $4\frac{1}{2}$  mm. longis apice acutis, lobo

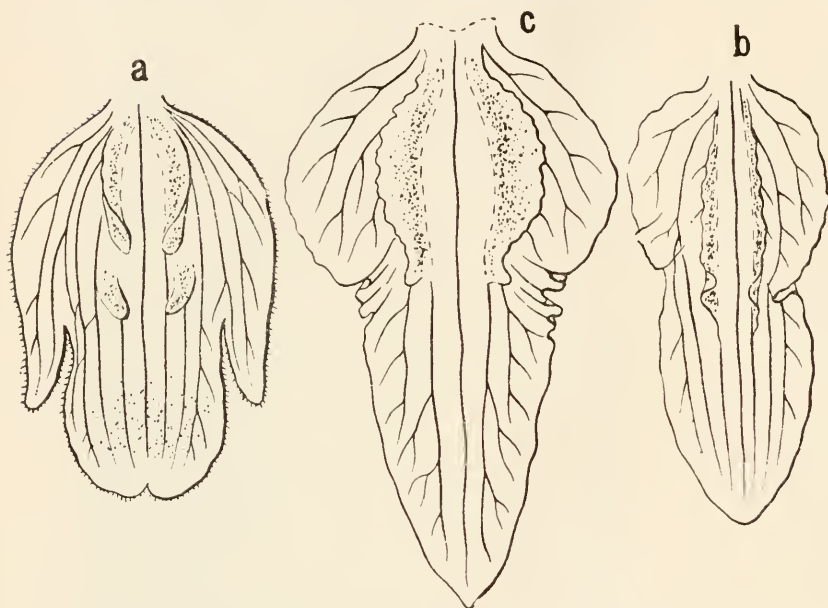


Fig. 38, a, *Cymbidium aloifolium* SWARTZ.; b, *Cymbidium misericors* HAYATA; c, *Cymbidium oreophilum* HAYATA; a, b and c,  $\times 3$ .

terminali (epichilo) oblongo 8 mm. longo 7 mm. lato apice truncatoapiculato vel retuso basi haud contracto 8-nervio. Columna 13 mm. longa semiteres sensim alata subrecurva basi ad pedem brevissimum 2-lobatum producta.

***Cymbidium arrogans* HAYATA sp. nov.** Folia lineari-lanceolata 30–40 cm. longa 13 mm. lata apice acuminata basi attenuata supra minute venulosa subtus prominente 3-nervia inter nervos minute venulosa. Scapi (racemi) 30 cm. longi erecti, parte non florifera 18 cm. longa vaginata, parte florifera 10–12 cm. longa, bracteis ovato-lanceolatis 1 cm. longis 2 mm. latis apice acutis, pedicellis cum ovario  $1\frac{1}{2}$  cm. longis. Flores apertientes  $3\frac{1}{2}$  cm. in diametro. Sepalum posticum oblongum 38 mm. longum 8 mm. latum apice obtuso-acutum basi  $\pm$  contractum 5-nervium margine integrum planum, lateralia oblonga  $2\frac{1}{2}$  cm. longa 8 mm. lata apice obtusa basi haud contracta desuper leviter  $\hookleftarrow$ -formiter falcata. Petala oblonga sepalo breviora 2 cm. longa 8 mm. lata

apice acuto-obtusa basi cuneato-contracta 5-nervia. Labellum ovato-oblongum 18 mm. longum 1 cm. latum facie brevissime hirsutum inter hypochilum et epichilum constrictum ad constrictionem 7 mm. latum, hypochilo subrotundato 1 cm. in diametro basi cuneato-contracto 9-nervio erecto medio discis 2-lamellatis instructo, lamellis ( )-formiter dispositis apice acutis, epichilo late ovato-rotundato 8-9 mm. lato 8 mm. longo apice rotundato-obtuso ad summum breve apiculato facie brevissime hirtellato 5-nervio patenti desuper recurvo. Columna complanata semi-teres 12 mm. longa.

HAB. KUSUKUSU, leg. B. HAYATA et S. SASAKI, Juni. 1912.

Near *C. ensifolium* Sw. (Bot. Mag. t. 1751; Sōmokudsetsu, Vol. VIII. tt. 1 et 2); but differs by the falcate semi-oblong lateral sepals.

**Cymbidium formosanum** HAYATA Mater. Fl. Formos. p. 335. Folia ad apicem pseudobulbi 4-5 fasciculata, fasciculo singulo basi vaginis 4 apice ovato-lanceolatis acuminatis subplicatis nervosis 6-14 cm. longis involucreto, lamina linearia lanceolata 40 cm. longa 6-7 mm. lata apice acuminata basi gradatim attenuata in exsiccatō coriaceo-membranacea, nervis principalibus 3 supra prominente elevatis, inter nervos multivenata. Scapi 1-florati 6-10 cm. longi basi multi-vaginati, vaginis prope medium scapi 7 cm. longis a basi usque ad medium cylindræis a medio usque ad apicem lanceolatis apice acuminatis scapem basi complete sursum fere amplexantibus glabris, vaginis superrimis cum flore subæquilongis. Flores solitarii apertientes 6 cm. in diametro, petalis sepalisque patentissimis, suberecti vel subnutantes, pedicellis cum ovariis 2-3 cm. longis gracilibus. Flores ut videntur in exsiccatō fusco-atro-purpurascens. Sepalum posticum oblanceolatum 38 mm. longum 9 mm. latum apice acuto-acuminatum basi angustato-cuneatum basi 3 mm. latum 5-nervium planum, lateralia cum postico æquiformia  $\pm$  longiora 4 cm. longa 1 cm. lata apice acuminata basi angustata basi 5 mm. lata margine leviter exteriore recurva 7-nervia. Petala oblonga oblongo-elliptica  $2\frac{1}{2}$  cm. longa circ. 1 cm. lata apice obtusissima vel obtusa basi 5 mm. lata 5-nervia plana. Labellum ampulliforme inferiore late rotundatum superiore oblongum, partibus late rotundatis (hypochilis) crassiusculis 12 mm. latis 9 mm. longis V-formiter versus longitudinem subplicatis medio discis 2-lamellatis instructis, lamellis ( )-formiter dispositis recurvis crassiusculis 1 mm. latis, partibus

superioribus (epichilis) oblongis 9 mm. longis apice rotundatis desuper reflexis liguliformibus margine subintegris. Columna elongata  $1\frac{1}{2}$  cm. longa 4 mm. lata antice subalata, alis  $\frac{1}{2}$  mm. latis. Capsula clavato-cylindrica 6–7 cm. longa 22 mm. lata 6–costata, costis 3 mm. latis, partibus inter costas 7 mm. latis, apice obtusissima basi attenuata rostrata ad stipitem gradatim abeuns, pedunculis 22 cm. longis.

HAB. Montibus centralibus, leg. U. MORI, Nov. 1906, (fl. et fr).

Near *C. virens* LINDL., but differs from it by the much longer and acuter sepals. Also near *Cymbidium Mackinnoni* DUTHIE, Ann. Roy. Bot. Gard. Calc. IX. t. 115, but quite distinguishable from it by the obovoid cylindrical and nearly clavate capsules, and by the much narrower sepals.

**Cymbidium illiberale** HAYATA sp. nov. Folia lineari-lanceolata 40 cm. longa 1 cm. lata apice acuminata basi attenuata utraque minute venulosa subtus distincte supra haud nervata valde coriacea. Scapi vel racemi 20 cm. longi erecti basi vaginato-squamati, parte non florifera 10 cm. longa, parte florifera 10 cm. longa, bracteis lanceolatis minutis 5 mm. longis acutis, pedicellis cum ovariis 18 mm. longis, floribus a se 1–3 cm. remotis. Sepalum posticum lineari-lanceolatum 18 mm. longum  $3\frac{1}{2}$  mm. latum apice triangulari-obtusum basi haud contractum 2 mm. latum planum manifeste 3–nervium vel obscure 5–nervium, lateralia quam postico breviora et latiora  $1\frac{1}{2}$  cm. longa  $4\frac{1}{2}$  mm. lata apice obtusa basi haud contracta 3 mm. lata lineari-oblonga plana distincte 7–nervia haud obliqua. Petala oblique lineari-oblonga  $1\frac{1}{2}$  cm. longa  $4\frac{1}{2}$  mm. lata apice obtusa basi angustiora  $1\frac{1}{2}$  mm. lata plana 7–nervia leviter  $\cap$ -formiter recurva. Labellum late obovatum facie brevissime hirsutum 13 mm. longum 11 mm. latum apice rotundatum vel ad summum breve triangulari-cuneatum, hypochilo erecto medio discis 2–costatis instructo, costis 8 mm. longis paralleliter dispositis, lobis lateralibus (hypochili) semi-oblongis apice rotundatis a basi labelli usque ad apicem 1 cm. longis 5 mm. latis erectis, lobo terminali (epichilo) desuper recurvo rotundato 6 mm. in diametro. Columna 13 mm. longa complanato-semiteres recurva intus brevissime hirsuta sursum alata, alis 1 mm. latis. Petala sepalaque viridescencia  $\pm$  rubescentia. Labelli disci flavescentes; labelli lobi laterales rubro-punctati, lobo terminali



rubro-maculato. Labellum subtus leviter rubescens basi atro-rubrum. Columna basi atro-sanguinea.

HAB. Formosa: loco non indicato: cult. in Taihoku seminario, Mart., 1914, leg. B. HAYATA, (fl.).

Near *Cymbidium pumilum* ROLFE (in Kew Bullet. 1907, p. 130; *Kinryō-hen*, Sōmokuzusetsu, XVIII. t. 13.); but differs from it by the light reddish green petals and sepals and by the lips which are light red with a red maculation on the front lobe, and numerous minute red spots on the side lobes.

**Cymbidium lancifolium** HOOK. f.; Orchid. Sikkim Himal. in Ann. Roy. Bot. Gard. Calc. VIII. t. 247.

HAB. Formosa: loco non indicato; cult. in bot. horto. Tōkyō, leg. B. HAYATA.

The orchid has been cultivated in our garden since some years, and is believed to have come from Formosa. The flowers are slightly different from the figure given in the above referred work.

**Cymbidium misericors** HAYATA sp. nov. (Fig. 38-b). Pseudobulbi vix prominentes. Fasciculus folii 4-5-foliatus. Folia lanceolata 30-40 cm. longa 11 mm. lata apice acuta vel obtusa basi attenuata basi in parte angustissima 5 mm. lata infra basin dilatata 1½ cm. lata pseudobulbos semi-amplexantia margine integra prope apicem sub lente denticulata in vivo tenuiter coriacea, nervis principalibus 3, inter nervos multivenulata, nervis venisque supra minus subtus plus prominentibus. Racemi (scapi) 15-20 cm. longi laxè florati, floribus a se 3-4 cm. remotis, bracteis lanceolatis circ. 1 cm. longis acuminatis, pedicellis cum ovariis 2½-3 cm. longis. Flores apertientes 4 cm. in diametro viridi-albescentes haud maculati fragrantès, inter menses Septembris et Octobris apertientes. Sepalum posticum oblongo-oblanœolatum 27 mm. longum 9 mm. latum supra medium latissimum apice acutum vel obtusum ad summum apiculatum basi ± angustius ad insertionem haud contractum 3 mm. longum subplanum vel margine tenuissime exteriore recurvum distincte 5-nervium crassiusculum margine integrum, lateralia cum postico æquilonga sed angustiora oblanœolata 6 mm. lata apice obtusa ad summum apiculata basi cuneato-angustata ad basin 3 mm. lata 5-nervia. Petala oblonga 24 mm. longa 1 cm. lata vel obovato-oblonga apice obtusa sed ad summum acuta basi obtuso-

contracta 2 mm. lata plana distincte 7-nervia. Labellum obovato-oblongum 21 mm. longum 12 mm. latum apice late obtusum basi rotundato-contractum, hypochilo 8 mm. longo 9 mm. lato valde concavo medio discis 2-lamellatis crassis instructo, epichilo rotundato 12 mm. longo desuper reflexo convexo 7-nervio, crassiusculum facie minute sub lente tuberculatum margine sub lente minute denticulatum. Columna 12 mm. longa leviter recurva semiteres  $\curvearrowright$ -formis in sectione apoda.

HAB. Mt. Kwannonzan, prope Tamsui; cult. in seminario Taihoku, leg. B. HAYATA et T. SŌMA, Mart. 1914.

Near *C. kanran* MK. (in Sōmokudsusetsu XVIII. t. 6), but differs from it by the greenish flowers with non-dotted lips.

**Cymbidium oreophilum** HAYATA n. sp. (Fig. 38-c). Folia et habitus ut speciei præcedentis (*Cymbidii misericordis*). Racemi (scapi) circ. 50 cm. longi, partibus non floriferis 30 cm. longis basi squamatis, squamis subvaginiformibus 4-5 cm. longis inferiore cylindraceis superiore lanceolatis apice acuminatis nervosis, floribus a se 5 cm. remotis, bracteis lanceolatis 2 cm. longis acuminatis, pedicellis cum ovariis  $3\frac{1}{2}$  cm. longis. Flores apertientes fragrantés 7 cm. in diametro viridescentes, sepalis petalisque retrorse reflexis; labellum flavescens rubro-maculatum. Sepalum posticum lineari-lanceolatum  $4\frac{1}{2}$  cm. longum 4 mm. latum apice acuminatissimum basi laud contractum sed leviter angustius 5-nerviū margine exteriorē recurvum valde retrorse reflexum, lateralia cum postico conformia sed  $\pm$  obliqua. Petala ovato-lanceolata 3 cm. longa 7-8 mm. lata apice acuminata basi contracta ad insertionem 2 mm. lata 5-nervia margine integra subplana. Labellum oblongo-ovatum 25 mm. longum 15 mm. latum apice obtusum apice triangulari-acutum tenuiter interiore recurvum basi rotundatum contractum ad insertionem 3 mm. latum, hypochilo late rotundato 14 mm. lato 12 mm. longo medio discis 2-lamellatis instructo, (lamellis ( )-formiter dispositis crassis 1 mm. latis recurvis sublævibus), concavo crassiusculo margine tenuissimo erecto, epichilo elongato-triangulari ovato  $1\frac{1}{2}$  cm. longo 1 cm. lato crassiusculo margine tenuissimo undulato-integro valde desuper recurvo. Labellum subtus læve supra toto minute tuberculatum margine sub lente minute denticulatum. Columna semiteres 13 mm. longa  $\curvearrowright$ -formis in sectione subalata.

*Cymbidium misericors* HAYATA var. *oreophilum* HAYATA in sched. herb. Taihoku.

HAB. Formosa: loco non indicato; cult. in seminario Taihoku, leg. B. HAYATA, Mart. 1914.

The present orchid was regarded as a variety of the preceding species. After careful examination, I have found that the sepals and petals of this new plant are considerably larger than those of the preceding species, and the lips of the former are minutely botryoideo-tuberculate all over the upper surface, while those of the latter are hirsute. All these collectively make it sufficient to regard this new plant as specifically different from the preceding species.

**Cymbidium purpureo-hiemale** HAYATA sp. nov. Folia angustissime linearia 40 cm. longa 5–6 mm. lata apice acuminata basi angustissime attenuato-plicata supra minute venulosa subtus 3-nervia, nervis prominentibus, inter nervos minute venulosa tenuiter coriacea. Scapi vel racemi 25–30 cm. longi, parte florifera 15 cm. longa laxe florata, floribus 3–4 cm. a se remotis, bracteis subnullis (vel caducissimis?) 1 mm. latis annuliformibus  $\frac{1}{10}$  mm. longis, pedicellis cum ovariis  $1\frac{1}{2}$  cm. longis. Flores apertientes  $6\frac{1}{2}$  cm. in diametro. Sepalum posticum lineari-lanceolatum 4 cm. longum 4 mm. latum apice acuminatum basi haud contractum 5-nervium margine interiore recurvum, lateralia quam postico vix breviora vix latiora  $3\frac{1}{2}$  cm. longa 4 mm. lata sursum margine interiore recurva. Petala ovato-lanceolata  $2\frac{1}{2}$  cm. longa 6 mm. lata apice acuta basi contracta  $1\frac{1}{2}$  mm. lata  $\pm$  concava margine plana 7-nervia. Labellum brevissime hirtellum in circumscriptione ovatum 22 mm. longum 12 mm. latum, hypochilo erecto late rotundato 12 mm. lato 9 mm. longo margine integro (lobis lateralibus erectis) medio discis 2-lamellatis instructo, lamellis circ.  $\frac{1}{2}$ –1 mm. latis ( )-formiter dispositis, epichilo desuper recurvo oblongo 12–13 mm. longo 7 mm. lato apice triangulari-obtusissimo ad apicem vel prope apicem margine interiore recurvo margine subintegro basi non contracto basi secus nervos manifeste hirtello, inter hypochilum et epichilum constrictum 6 mm. latum. Columna 12 mm. longa tenuiter recurva complanato-semi-teres sursum subalata.

HAB. Formosa: loco non indicato: cult. in seminario Taihoku, leg. B. HAYATA, 1914, Mart.

Near *Cymbidium kanran* MAK. in Sōmokuzusetsu Vol. XVIII. tt. 4, 5

et 6, but differs from it by the lips with hirsute lines on the terminal lobes.

***Cymbidium simonsianum* KING et PANTLING**

(Fig. 39). Orch. Sikk. Himal. in Ann. Roy. Bot. Gard. VIII. t. 250. HAB.

Mt. Arisan. Observ. Folia 40-50 cm. longa linearia 9 mm. lata apice acuminata basi attenuata in exsiccato valde coriacea utraque pagine laud distincte nervata sed minute elevato-venulosa basi cum petiolis articulata, petiolis 6 cm. longis late sulcatis semicircularibus in sectione in explicato 6 mm. longis basi dilatatis, partibus dilatatis ovatis 1 cm. longis totiusque latis semiamplexicaulibus. Scapi vel racemi

45 cm. longi basi vaginato-squamati, squamis 6-7 cm. longis acuminatis lanceolatis, bracteis triangulari-lanceolatis 5 mm. longis, floribus apertientibus 4½ cm. in diametro. Sepa-

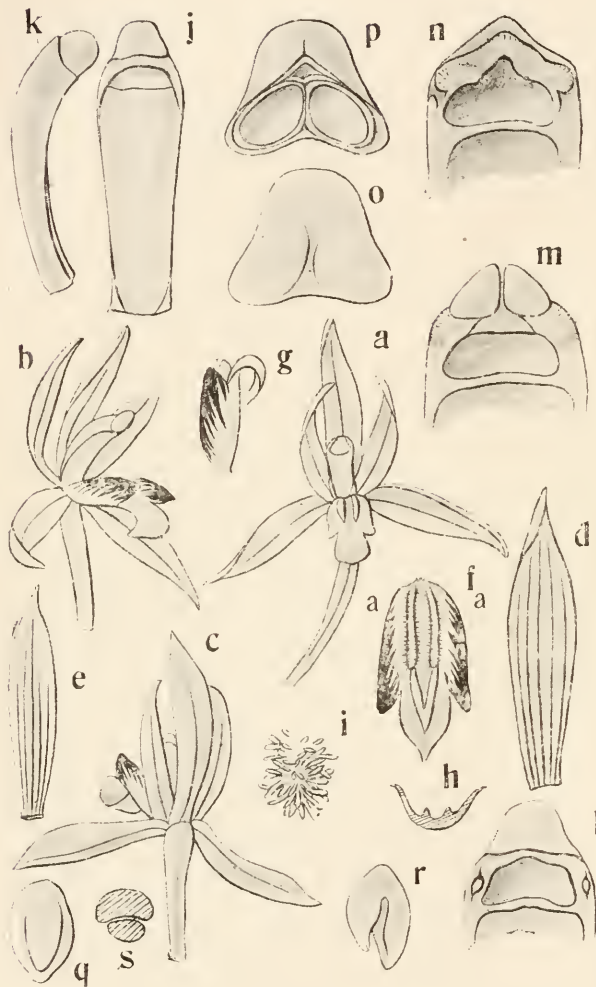


Fig. 39, *Cymbidium Simonsianum* K. et P.; a, b, c, a flower, seen from different sides; d, a sepal; e, a petal; f, a lip; g, the same, seen from side; h, the same, in section a portion shown by a-a in fig. f; i, a portion of the disc; j, a column; k, the same, seen from side; l, apical portion of the same; m, the same, operculum taken off; n, the same, pollinarium taken off; o, an operculum, seen from front; p, the same, seen from back; q, a pollinium; r, the same, seen from side; s, the same in section; fig. a-c, natural size; others more or less magnified.



lum posticum oblanceolatum  $2\frac{1}{2}$  cm. longum  $6\frac{1}{2}$  mm. latum apice acuminatum basi non contractum 4 mm. latum prope apicem margine interiore recurvum 7-nervium, lateralibus cum postico conformia plus minus obliqua. Petala oblongo-lanceolata 2 cm. longa  $5\frac{1}{2}$  mm. lata apice acuto-acuminata basi vix contracta  $1\frac{1}{2}$  mm. lata 7-nervia margine integra plana. Labellum in circumscriptione ovatum 16 mm. longum 11 mm. latum apice cuspidato-acuminatum basi cuneato-rotundatum ad basin contractum  $1\frac{1}{2}$  mm. latum facie glabrum basi in hypochilo erecto medio discis 2-carinatis instructum, carinis 6 mm. longis  $\frac{1}{2}$  mm. latis elevatis hirtellis paralleliter ||-formiter dispositis, 3-lobum, lobis lateralibus (hypochili) oblongis  $2\frac{1}{2}$  mm. latis a basi lobi terminalis ad apicem lobi lateralis  $3\frac{1}{2}$  mm. longis apice obtusis, sinibus inter lobos laterales et lobum terminalem obtusis, lobo terminali (epichilo) desuper recurvo ovato 9 mm. longo 6 mm. lato apice cuspidato-acuminato basi rotundato-contracto ad basin 5 mm. lato. Columna 1 cm. longa complanato-semiteres 4 mm. lata glaberrima subulata, alis sursum  $\frac{1}{2}$  mm. latis.

**Cymbidium sinense** WILLD.; Sōmokudsusetsu XVIII. t. 11.

HAB. Heichōshō, leg. S. NAGASAWA, fl. 1904, (No. 340).

OBSERV. Folia lanceolata 50 cm. longa  $2\frac{1}{2}$  cm. lata apice acuminata basi attenuata supra utroque latere costæ prominente 2-nervata inter nervos minute venulosa, costa supra non distincta non elevata, subtus cum costa prominente 3-nervata, inter nervos minute venulosa. Scapi vel racemi 60–70 cm. longi, parte non florifera 40 cm. longa vaginato-squamata, squamis cylindrico-lanceolatis acuminatis 7–8 cm. longis, parte florifera 20 cm. longa laxè florata, floribus a se 3–4 cm. remotis, bracteis lanceolatis acuminatis 12 mm. longis glabris, pedicellis cum ovariis 2 cm. longis. Flores apertientes 5–6 cm. in diametro. Sepalum posticum lineari-lanceolatum  $3\frac{1}{2}$  cm. longum  $\frac{1}{2}$  cm. latum, apice acuminatum basi vix contractum 2 mm. latum margine  $\pm$  exteriori recurvum 7-nervium, lateralibus cum postico conformia. Petala ovato-lanceolata 26 mm. longa 8 mm. lata apice obtusa ad summum acuta basi obtuso-contracta 2 mm. lata 7-nervia plana. Labellum tenuissime hirtellum in circumscriptione ovatum 17 mm. longum 10 mm. latum obtusissimum basi rotundato-cuneato-contractum  $1\frac{1}{2}$  mm. latum, hypochilo late rotundato 9 mm. longo 1 cm. lato medio discis 2-lamellatis instructo, (lamellis sursum latiusculis versus apicem se convergentibus

(-)formiter dispositis), erecto margine latere erecto, epichilo oblongo 11 mm. longo 7 mm. lato apice obtuso basi vix vel haud contracto secus nervos subtuberculato transverse maculato. Columna 13 mm. longa  $\pm$  recurva complanato-semiteres alata.

*Cremastra* LINDL.

***Cremastra triloba* HAYATA** (Fig. 40) Ic. Pl. Formos. II. p. 135. Herba terrestris, rhizomate erecto tuberoso ovoideo-globoso  $1\frac{1}{2}$  cm. longo basi totiusque

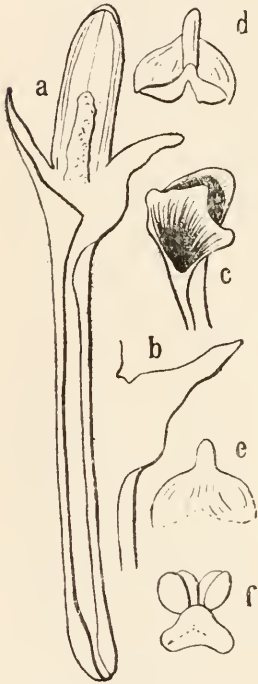


Fig. 40, *Cremastra triloba* HAYATA; a, a lip; b, lateral lobe of the same; c, apical portion of the column; d, an anther, seen from back; e, the same, seen from front; f, pollinarium.

lato apice acuto basi latissimo 2-3 nodoso ad nodos vaginato, (vaginis defectis), ad apicem folium unum gerenti, ad nodos juxta apicem scapum unum gerenti. Folia solitaria longe petiolata basi petioli 1 (vel 2?) vaginis instructa, (vaginis petiolum in longitudine superantibus apice plus minus dilatatis obtusis), petiolis 10-12 cm. longis dimidium laminæ in longitudine æquantibus subteretibus tubulosis, laminis cum petiolum articulatis elliptico-lanceolatis 30 cm. longis. 5 cm. latis apice acutis basi attenuatis linearibus, (partibus linearibus 6-7 cm. longis 3 mm. latis plicatis, petiolis articulato-continuis) membranaceis, venis elevatis subplicatis. Scapi solitarii 30-40 cm. alta teretes 5 mm. in sectionis diametro basi 2-nodosi, internodiis inferioribus 4 cm. longis, superioribus 10 cm. longis ad nodos vaginatis, (vaginis tubulosis 5-6 cm. longis apice acutis vel obtusis,) partibus florigeris 10-15 cm. longis racemosis. Flores ascendento-patentes vel erecto-patentes plus minus secundi 3 cm. longi, segmentis conniventibus apice vix patentibus, pedicellis (cum ovaris) 13 mm. longis, bracteis lanceolatis 8 mm. longis. Sepala subæqualia conniventia lineari-oblancoolata apice acuta basi attenuata,

posticum 33 mm. longum 4 mm. latum basi non contractum, lateralia plus minus obliqua. Petala angustiora lineari-oblancoolata breviora quam sepalis 30 mm. longa 3 mm. lata apice acuta basi attenuata. Labellum lineare

sepalum posticum in longitudine æquans 33 mm. longum versus apicem 3-lobatum, (lobo medio oblongo 8 mm. longo  $3\frac{1}{2}$  mm. lato apice obtuso vel rotundato basi non contracto, lobis lateralibus angulo  $45^\circ$  divaricatis lanceolato-triangularibus basi latere inferiore auriculatis plicatis 4 mm. longis apice obtusis vel acutis), basi lobi medii 1-appendiculatum, appendiculis liguliformibus liberis crassiusculis minute tuberculatis, margine a lobis lateralibus usque ad basin labelli plicato-inflexum basi leviter ventricosum. Columna linearis 23 mm. longa labello brevior exalata apice dilatata, partibus dilatatis obtriangularibus 3-4 mm. latis; rostellum latissimum. Pollinia 4.

HAB. Mt. Nashitanzan, Mt. Rontabunzan, Jiögesha, leg. U. MORI, Aprili., 1910.

Near a small form of *C. Wallichii*, but differs distinctly by the labellum, the lobes of which are much more divaricate. In the Indian species, the side lobes of the lips are nearly parallel to the middle lobe.

*Luisia* GAUD.

**Luisia megasepala** HAYATA sp. nov. (Fig. 41). Epiphyta. Caulis teres viridis 20-30 cm. longus ramosus cum vaginis foliorum 4 mm. in diametro tota longitudine foliosus vaginis foliorum toto obtectus. Folia alterna a se 2 cm. remota; vagina foliorum cylindrica 2 cm. longa 4 mm. in diametro ore subtauncata vel leviter obliqua, lamina foliorum  $\pm$  lateraliter compressa tereto-lineari circ. 10 cm. longa 2 mm. in diametro apice obtusa basi oblique cum vaginis articulata. Racemi 2-3-florati latere caulis per vaginam oriundi brevissimi, rhachibus 1 cm. longis bracteis pluri-seriatis perfecte obtectis, bracteis distiche imbricateque dispositis latissime triangularibus, superioribus majoribus 3 mm. longis 6 mm. latis, pedicellis 1 cm. longis, floribus subcernuis. Sepala leviter viridia dorso purpureo-punctata, petalis flavo-viridibus, labello supra atro-purpureo subtus medio viridi, partibus lateralibus labelli purpureis. Sepalum posticum oblongum 13 mm. longum 7-8 mm. latum 6-nervium apice rotundatum basi 6 mm. latum; sepala lateralia oblonga 13 mm. longa 7-8 mm. lata apice dorso carinata leviter cornuata 5-nervia. Petala obovato-oblonga sepalo longiora 16 mm. longa 7 mm. lata apice obtuso-rotundata deorsum  $\pm$  angustiora basi 3 mm. lata. Labellum obovato-cuneiforme 16 mm. longum 9 mm. latum sessile basi latere lobis basilaribus instructum, lobis basilaribus triangulari-

bus 3 mm. longis 2 mm. latis erectis apice sub-acutis, basi medio supra saccatim

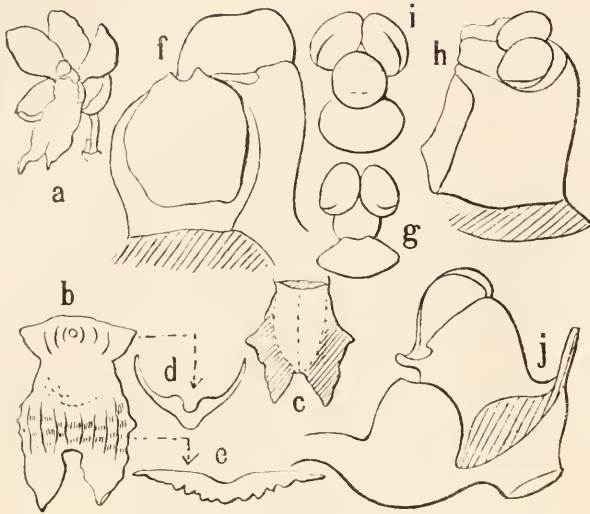


Fig. 41, *Luisia megasepala* HAYATA; a, a flower; b, a lip, seen from above; c, the same, seen from below, shading shows purple colored parts; d, section of the part shown by a chain-line; e, section of another parts shown by another chain-line; f, a column; g, the same, seen from side; h, the same, anther taken off; i and j, pollinarium, seen from different sides; k, natural size, others more or less magnified.

inpressum supra partem basilarem constrictum  $4\frac{1}{2}$  mm. latum sursum dilatatum supra medium 9 mm. latum apice 2-lobatum, (lobis triangulari-oblongis 3 mm. longis totiusque latis apice obtusis), margine medio lobulatum sursum et deorsum integrum crassiusculum, supra reticulato-sulcato impressum subtus læve, utraque pagine sub microscopio minute muricato - punctatum. Columna brevissima 4 mm. longa.

HAB. Formosa: cult. in seminario Taihoku, leg. B. HAYATA, Aprili., 1914.

Near *L. teres* Bl. and *L. liukiensis* SCHLECHT.; but differs from them by the broader petals and sepals, and triangular basal lobes of the lip.

### *Diploprora* Hook. f.

***Diploprora kusukusensis* HAYATA sp. nov.** (Fig. 42). Epiphyta. Caulis subteres 5-10 cm. longus vaginis foliorum obtectus. Folia alterna oblongo-lanceolata 8 cm. longa 2 cm. lata apice acuta ad summum brevissime 2-loba basi obtusa cum vaginis articulata subdistichum disposita margine integra  $\cup$ -formiter falcata crassiuscula subconcolora, venis lateralibus parallelis in exsiccato elevatis. Racemi 5 cm. longi pauce floriferi, floribus 3-5, pedicellis divaricatis 5 mm. longis, bracteis late triangularibus 3 mm. longis medio plicatis rhachin amplectantibus. Flores subalbi vel leviter flavescenti-albi patentes 15 mm. in diametro. Sepalum posticum obovato-



oblongum 9 mm. longum 4 mm. latum 7-nerviū apice rotundatum basi plus minus angustius  $2\frac{1}{2}$  mm. latum dorso medio carinatum, lateralia postico subæquiformia. Petala oblique oblongo - oblanceolata 8 mm. longa 3 mm. lata apice obtusa 5-nervia. Labellum latissime naviculiforme apice lineari-caudatum ad summum bisetosum basi latissimum 4 mm. latum sursum subito contractum ad caudam linearem 3 mm. longam productum, (cauda lineari deorsum laterale compressa sursum dorso compressa ad summum setis 2 instructa, setis 2 mm. longis subcrispis filiformibus), medio intus callo uno instructum, callo obtriangulari 3 mm. longo apice 2 mm. lato. Columna 2 mm. longa.

HAB. Kusukusu, Juni., 1912, leg. B. HAYATA et S. SASAKI.

Very near *D. Championi*, but differs by the longer threads at the apex of the labellum and by the other points.

***Diploprora uraiensis* HAYATA sp. nov.** (Fig. 43). Epiphyta subpendula? Caulis 18 cm. longus toto foliosus vaginis foliorum obtectus. Folia crassiuscula oblongolinearia vel lineari-lanceolata 11 cm. longa 2 cm. lata  $\cup$ -formiter falcata apice inaequaliter breviter bi-lobata, lobis 1 mm. longis acutis, basi contracta cum vaginis articulata in exsiccatō venis lateralibus parallelis elevatis, utraque pagine sub-concolora subdistichum disposita  $1\frac{1}{2}$  cm. a se remota, vaginis circ.



Fig. 42, *Diploprora kusukusensis* HAYATA; a, part of inflorescence and a flower; b, the same flower, seen from back; c, central part of the same flower; d, a lip, with transverse section; e, the same lip with vertical medial section; f, stigma, rostellum ad clinandrium; g, an anther; h, the same, seen from back; i, pollinarium; j, the same seen from back.

2 cm. longis ore truncatis. Racemi laterales 7 cm. longi paucè florati, floribus 4-5 remote dispositis, pedicellis 5 mm. longis patentibus, bracteis lanceolatis. Flores patentes  $1\frac{1}{2}$  cm. in diametro. Sepala et petala flava; columna alba;

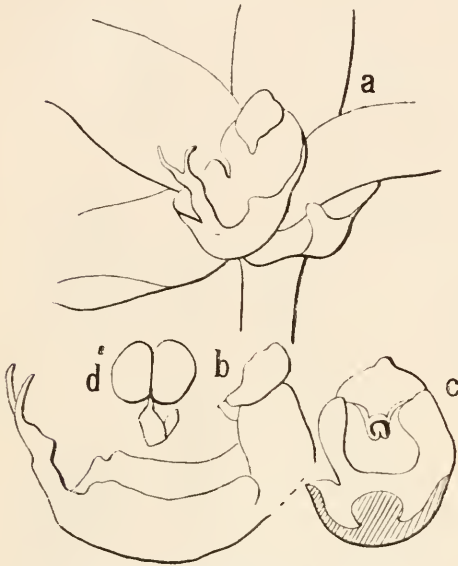


Fig. 43, *Diploprora uraiensis* HAYATA; a, central portion of a flower; b, the same seen from side sepals and petals taken off; c, a column with basal portion of a lip, seen from front; d, a pollinarium.

labellum album intus maculatum, maculis flavescentibus. Sepalum posticum oblongo-oblanceolatum 8 mm. longum  $3\frac{1}{2}$  mm. latum apice obtuso-rotundatum basi angustatum  $1\frac{1}{2}$  mm. latum dorso medio carinatum, lateralia postico latiora. Petala oblique lineari-oblonga 8 mm. longa 3 mm. lata apice obtusa 5-nervia. Labellum latissime naviculi-forme apice lineari-caudatum ad summum setis 2 instructum cum cauda, setaque 8 mm. longum parte basilari latissima, 4 mm. lata 3 mm. longa quadrangulati intus callosa, (callo obtriangulati-oblongo basi acuto 3 mm. longo  $1\frac{1}{2}$  mm. lato), apice subito contracta ad caudam abeunti, cauda lineari  $2\frac{1}{2}$  mm. longa setis filiformibus

suberispis  $1\frac{1}{2}$  mm. longis duabus instructa. Columna  $2\frac{1}{2}$  mm. longa. Capsula cylindrica utrinque acuta 4 cm. longa 1 cm. lata.

HAB. Uraisha, 1914.

Near *D. kusukusensis* HAYATA, but differs from it by the smaller yellow flowers and larger leaves.

### *Saccolabium* BLUME.

***Saccolabium formosanum* HAYATA** (Fig. 44) Mater. Fl. Formos. p. 336. Herba epiphytica, caulibus foliatis non pseudo-bulbosis prostratis vaginis foliorum persistentibus instructis ad nodos radican- tibus. Folia disticha carnea plana oblonga 2 cm. longa 7 mm. lata apice obtusa breve apiculata basi in petiolum 2 mm. longum cum vaginis articulatum deciduum

contracta, vaginis 5 mm. longis persistentibus caulem obtegentibus. Racemi laterales breves 3 cm. longi pauciflorati, bracteis minutis scariosis, pedicellis 1 cm. longis, floribus mediocribus 13 mm. in diametro. Sepala æqualia libera patentia oblonga 5 mm. longa 3 mm. lata apice utrinque obtusa concava. Petala patentia sepalo subsimilia apice rotundata margine exteriori recurvata. Labellum ad basin columnæ sessile basi saccatum, saccis majusculis 6 mm. longis totiusque latis, ore contracto 4 mm. in diametro, lamina patenti latissima 4 mm. longa 1 cm. lata apice truncata latere divaricata obtusa. Discus ad medium laminae incrassatus hirsutus. Columna brevis  $1\frac{1}{2}$  mm. longa 3 mm. lata; rostellum 3-dentatum, dentibus desuper recurvis.

HAB. Arisan, in monte Morrison, leg. T. KAWAKAMI et U. MORI, Mart. 1908, (No. 3164).

Somewhat near *S. japonicum* but differs from it in having flowers with longer peduncles. There is none like this at Kew.

**Saccolabium fuscopunctatum** HAYATA (Fig. 45) Ic. Pl. Formos. II. p. 143. Epiphyta, caulibus prostratis ad nodos radicanibus foliosis. Folia disticha alterna crassa angulo  $90^\circ$  a caule divaricata angustata vel angustato-oblonga 2 cm. longa vel longiora 4–5 mm. lata desuper arcuata apice acuta basi rotundata subsessilia supra 1-sulcata subtus plus minus convexa supra fusco-purpureo-punctata subtus fusco-purpureo-maculato-punctata, vaginis imbricatis cylindraceis 5 mm. longis ore obliquis basi angustis muculato-punctatis. Racemi breves pauciflorati, floribus 1–2. Flores flavescentes rubro-purpureo-



Fig. 44, *Saccolabium formosum* HAYATA; a, a flower; b, a lip and column, lamina taken off; c, a lip, column and a dorsal sepal, medially cut; d, pollinarium in an anther, seen from front; e, pollinarium, seen from back; f, the same, seen from back.



Fig. 45, *Saccolabium fuscopunctatum* HAYATA; a, a flower bud, seen from side; b, an opened flower, seen from front; c, sepals and petals, explicated; d, lip and column; e, the same, medially cut; f, apical portion of a column, rostellum and anther are seen; g, the same, anther taken off, to show clinandrium; h, operculum, seen from back.

punctati 9 mm. in longo diametro, pedicellis 1 cm. longis, bracteis oblongo-triangularibus obtusis. Sepala patentia reflexa, posticum ellipticum 4 mm. longum  $2\frac{1}{3}$  mm. latum apice rotundatum basi truncatum non contractum, lateralibus cum postico æqualibus. Petala sepalis subæqualia. Labellum basi ad columnam adnatum plus minus cum alis columnæ continuum saccatum, sacco 5 mm. longo punctato-maculato ore contracto, lamina rotundata 2 mm. in diametro apice brevissime 2-lobata valde concava, disco ad medium laminae sito incrassato hirsuto. Columna brevis 1 mm. longa 3 mm. lata, rostellum 2-dentatum.

HAB. Arisan, leg. B. HAYATA et S. SASAKI, Jan., 1912.

Near *S. formosanum*, but differs by the maculated leaves and the much smaller rounded lobes of the labellum. Also near *S. Matsuran* MAK. from which this differs by the much larger flowers. It was brought back by myself from Arisan here to the Koishikawa

Garden, where it flowered in May, 1912, in a green house.

***Saccolabium quasipinifolium* HAYATA** (Fig. 46) Ic. Pl. Formos. II. p. 144. Epiphyta 4-5 cm. alta, radicibus teretibus incrassatis albicantibus 2 mm. in sectione 20-30 cm. longis undulato-reflexis. Caules dense foliati 7-8 cm. longi, vaginis foliorum imbricatis. Folia 8-9 disticha alterna acerosa extrorse leviter recurvata subteretia cum vaginis circ. 10 cm. longa intus (supra) profunde sulcata extus (subtus) rotundata in sectione apice obtusa vel acuta basi cum vaginis articulata extus basi plus minus costata, vaginis dilatatis caulem semi-amplectantibus fusco-purpurascensibus explicato 7 mm. latis glabris. Racemi axillares 1-2-3-florati folium in longitudine æquantes, pedunculis 5-6 cm. longis ad medium bracteis unis instructeis, bracteis (non



floriferis) vaginiformibus 5-6 mm. longis obtusis. Flores apertientes 2 cm. in longo diametro 1½ cm. in brevi diametro albo-viridescentes basi bracteis unis instructi, bracteis (floriferis) circ. 1 cm. longis florem amplectantibus obtusis, pedicellis (cum ovariis) 8 mm. longis 5-6-sulcatis. Sepalum posticum obovatum 9 mm. longum obtusum basi non contractum 3-nervium dorso carinato-costatum, lateralibus valde obliquis posticum in longitudine æquantibus acuto-obtusis latere inferiore latioribus dorso 4-carinato-costatis. Petala sepalis subæqualia sed plus minus breviora 3-nervia carinato-costata. Labellum horizontaliter patens 1 cm. longum 3-lobum 1-calcaratum, (calcarei 1-1½ cm.



Fig. 46, *Saccolabium quasipinifolium* HAYATA; a, the plant; b, a leaf; c, d, a flower, seen from side; e, the same, seen from front, e, detached sepals and petals; f, a flower, sepals and petals taken off, seen from side; g, the same, seen from back; h, lamina of the lip; i, a detached lip; j, the same, medially cut; k, a column on the peduncle, anther taken off; l, the same, medially cut; m, the same, seen from front; n, a pollinarium, pollinia, caudicle and gland; o, an anther, seen from front; p, the same, seen from back; q, a pollinium; r, a fruit; s, seeds; t, threads in the capsule. a-j, and r, natural size; others variously magnified.

longo retrorsum recurvo apice obtuso ore dilatato), lobis lateralibus ad latus faucis calcaris erectis latiusculis oblique triangularibus 4-5 mm. altis basi 6 mm. latis apice obtusis, lobo medio valde convexo 8 mm. longo 6 mm. lato apice obtuso breve 2-apiculato minute denticulato multi-nervio; disco basi lobi centralis transverse sito plurilobulato, lobulis calloso-lamellatis, lamellis 1-2 mm. longis obtusis. Columna 6 mm. longa 3 mm. lata alata, rostellum antice acutum 2-lobum. Anthera rubescens 3 mm. longa  $2\frac{1}{2}$  mm. lata antice acuta postice medio 1-costata 1-ocularis; pollinia 2 subglobosa sulcata, stipitibus lamellatis linearibus  $3\frac{1}{2}$  mm. longis circ.  $\frac{1}{2}$  mm. latis basi attenuatis. Capsula cylindrica apice breve basi longe attenuata 4 cm. longa 8 mm. lata multicostata. Semina minuta fusiformia cum fibris longissimis multis mixta.

HAB. Mt. Arisan, leg B. HAYATA et S. SASAKI, Jan., 1912.

**Saccolabium retrocallum** HAYATA sp. nov. (Fig. 47). Epiphyta.

Caulis subteres in nostro specimine brevis  $1\frac{1}{2}$ -2 cm. longus foliatus, internodiis brevibus. Folia disticha elliptico-oblonga crasso-coriacea  $2\frac{1}{2}$  cm. longa 1 cm. lata apice obtusa basi contracta cum vaginis articulata 9-nervia margine leviter desuper recurva, vaginis persistentibus 3 mm. longis imbricatis caulem obtegentibus. Pedunculi laterales simplices folio aequilongi 2 cm. longi basi medio apiceque

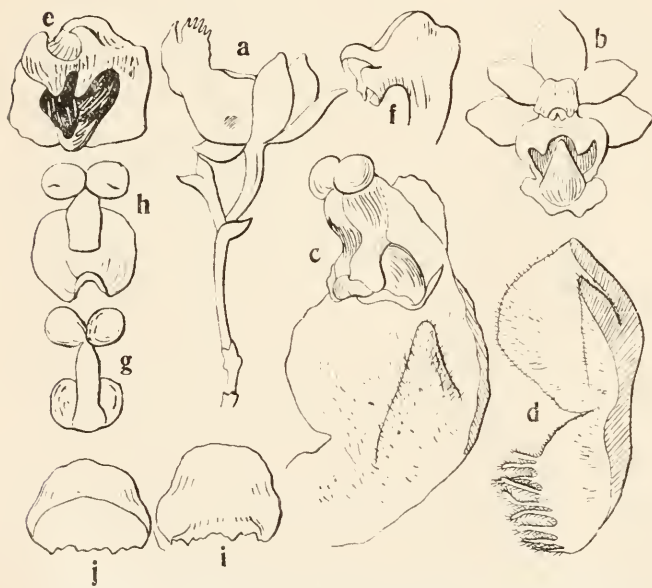


Fig. 47, *Saccolabium retrocallum* HAYATA; a, a flower on the inflorescence, purple colored portion is shaded; b, a flower, seen from front, purple colored parts are shaded; c, a column and lip, the latter partially cut off; d, a lip, medially cut, showing a refracted callosity; e, columna, anther taken off, stigma and clinandrium are seen; f, the same, seen from side; g, a pollinarium, seen from front; h, the same, seen from back; i, an operculum, seen from front; j, the same, seen from back.

bracteis instructi, bracteis infimis tubiformibus 2 mm. longis, eis superioribus late triangularibus  $1\frac{1}{2}$  mm. longis. Flores in nostro specimine solitarii apertientes  $1\frac{1}{2}$  cm. in diametro. Sepala patentia distincta albo-flavescentia 5-nervia, posticum ovato-oblongum 7 mm. longum  $3\frac{1}{2}$  mm. latum apice obtusum basi leviter cuneato-contractum ad basin  $1\frac{1}{2}$  mm. latum, lateralia angustiora quam postico  $\pm$  obliqua 8 mm. longa 3 mm. lata apice acuta basi cuneato-angusta. Petala sepalo breviora angustato-oblonga 7 mm. longa  $2\frac{1}{2}$  mm. lata apice obtusa basi angustata. Labellum ad basin columnæ sessile patens in circumscriptione oblongum ecalcaratum sepalis longius 14 mm. longum 8 mm. latum concavum sursum medio valde crassum, callo uno triangulari retrorso instructum medio contractum, lobis lateralibus (vel auriculis) 2 mm. longis  $5\frac{1}{2}$  mm. latis margine minute ciliolatis, lobo terminali rotundato 7 mm. longo 8 mm. lato apice emarginato margine breve fimbriato. Labellum extus glabrum intus breve hirsutum intus prope callum ancori-forme purpureo-coloratum, (callo colorato), cæterum albicans. Columna brevis lata 1 mm. longa apoda exalata, clinandrium dentibus 2 instructum. Anthera terminalis opercularis incumbens, pollinia 2 globosa cerea vix sulcata; caudicula linearis  $2\frac{1}{2}$  mm. longa, glandula cordato-rotundata parva. Fructus ignoti.

HAB. Formosa: loco non indicato; cult. in seminario Taihoku, leg. B. HAYATA, Juni., 1912.

Remarkable for the large obtriangular retrorse callosities on the center of the lips.

**Saccolabium Somai** HAYATA sp. nov. Epiphyta; caulis 7–8 cm. longus. Folia altera distiche disposita lineari-oblancoolata 14 cm. longa 17 mm. lata apice mucronato-acuta ad summum obtusa basi attenuata crassiuscula in exsiccato chartaceo-membranacea  $\smile$ -formiter recurva cum vaginis articulata, vaginis 5 mm. longis apice truncatis cum foliis articulatis nervosis. Racemi laterales 2 cm. longi pauci-florati. Sepalum posticum lineari-obovatum 6 mm. longum 3 mm. latum apice obtusissimum basi angustius 1 mm. latum 3-nervium, lateralia obovata 6 mm. longa  $2\frac{1}{2}$  mm. lata 3-nervia apice obtusa basi cuneato-angustata. Petala sepalo subsimilia angustiora. Labellum sacciforme 7 mm. longum 5 mm. latum ore 3 mm. in diametro apice antice lamina late triangulari instructum, lamina transverse  $\sim$ -formi 7 mm. lata  $2\frac{1}{2}$  mm. longa medio

rugoso-crassa basi utraque latere auriculis instructa, auriculis rotundatis  $1\frac{1}{2}$  mm. in diametro, margine subintegrum. Pollinia 2 ovoidea 1 mm. longa ad centrum minute 1-foveolata, stipite lineari  $1\frac{1}{2}$  mm. longo, glandula elliptica 1 mm. longa antice 2-lobata.

HAB. Pinansha, leg. T. SŌMA, Mart., 1913.

*Sarcanthus* LINDL.

***Sarcanthus fuscomaculatus* HAYATA sp. nov.** (Fig. 48)  
Epiphyta; radices aëriæ a latere caulis oriundæ simplices teretes albæ 5 mm. in diametro apice 2-3-divisæ. Caulis 30 cm. longus teres 5 mm. in diametro vaginis foliorum obtectus, vaginis 2-3 cm. longis 1 cm. latis cum foliis articulatis. Folia linearia 16 cm. longa 17 mm. lata basi apiceque æquilata apice biloba (lobis inæqualibus 5-7 mm. longis 6 mm. latis) basi plicata cum vaginis articulata in exsiccato coriacea.

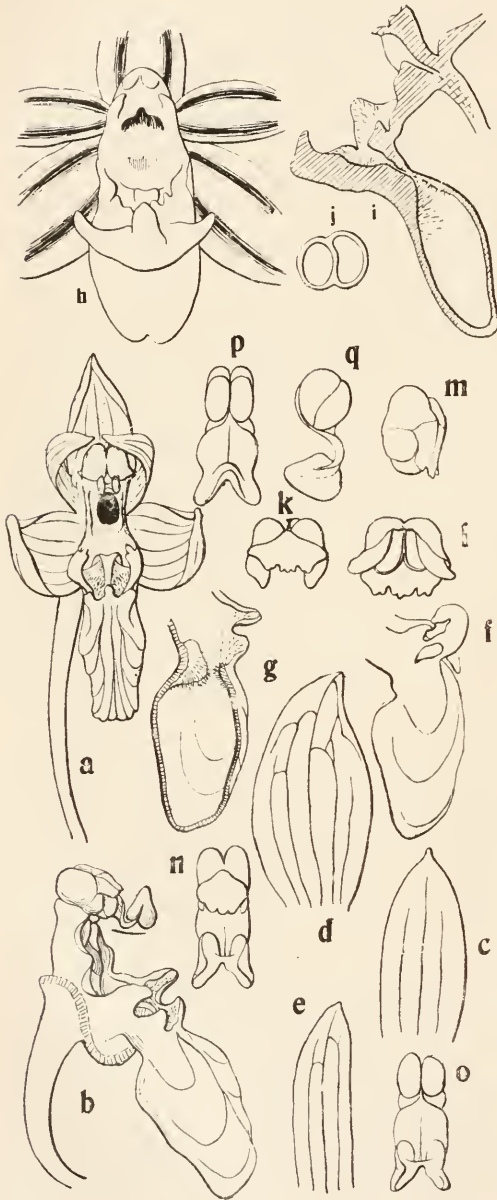



Fig. 48, *Sarcanthus fuscomaculatus* HAYATA; a, a flower; b, another flower, sepals, petals and terminal lobe of the lip taken off; c, a dorsal sepal; d, a lateral sepal; e, a petal; f, a lip, seen from side; g, the same in vertical section, terminal lobe taken off; h, a lip and column, seen from front; i, the same, in vertical section; j, transverse section of a spur; k, an operculum, seen from front; l, the same, seen from back; m, the same, seen from side; n, pollinarium with an operculum; o, pollinarium, seen from front; p, the same, seen from back; q, the same, seen from side.



Panicula lateralis 20-25 cm. longa, pedunculis (partibus non floriferis) 10 cm. longis glabris, ramis 4-5 simplicibus 8 cm. longis gracilibus patentibus desuper recurvis, floribus a se 5 mm. remotis, bracteis triangularibus 2 mm. longis acutis  $1\frac{1}{2}$  mm. latis retrorse reflexis. Sepalum posticum  $4\frac{1}{2}$  mm. longum oblongum  $2\frac{1}{3}$  mm. latum basi haud contractum obscure 3-nervium apice obtusum, lateralia oblonga  $4\frac{1}{2}$  mm. longa 3 mm. lata apice rotundato-obtusa basi haud contracta. Labellum ad pedem brevem columnæ affixum 4 mm. longum basi calcaratum, calcar 5 mm. alto 2 mm. lato apice obscure 2-lobo vel emarginato intus lamina una verticali partito 2-loculari intus prope orem hirsuto ore callosis posterioribus lateralibusque semiclauso, lobis lateralibus latissime triangularibus 1 mm. longis 2 mm. latis erectis margine interiore recurvis apice obtusis, lobo terminali -formi 2 mm. longo basi latissimo 4 mm. lato ad insertionem constricto 1 mm. lato 3-lobulato, lobulis basilaribus (lateralibus) triangulari-linearibus 2 mm. longis  $\frac{1}{2}$  mm. latis apice acuminatis, lobulo terminali anguste triangulari  $1\frac{1}{2}$  mm. longo  $1\frac{1}{2}$  mm. lato apice interiore incurvo cum facie connato. Columna 2 mm. longa 1 mm. lata a basi in pedem 1 mm. longum alatum producta, anthera globosa 1 mm. in diametro 2-locularis. Pollinia 2, singulum 2-lobatum, stipite late lineari 1 mm. longo  $\frac{1}{2}$  mm. lato. Flores flavi; sepala et petala intus prope marginem fusco-punctato-maculata; columna basi fusco-maculata.

HAB. Formosa: loco non indicato; cult. in seminario Taihoku.

*Cleisostoma* BLUME.

***Cleisostoma brachybotrya*** HAYATA sp. nov. (Fig. 49). Epiphyta. Caulis 7 cm. longus tota longitudine foliatus. Folia approximata subdistiche disposita linearia 15 cm. longa 3 cm. lata apice subtruncata subbiloba, (lobo altero longiore 6 mm. longo 5 mm. lato apice obtuso, lobo altero subnullo apice truncato) margine integra in exsiccatu tenuiter coriacea basi  $\pm$  contracta ad basin plicata cum vaginis articulata, vaginis imbricatis non cylindraceis plicatim caulem amplexantibus 2 cm. longis in explicato 2 cm. latis nervosis. Racemi axillares 3 cm. longi vel longiores, pedunculis (partibus non-floriferis)  $1\frac{1}{2}$  cm. longis, partibus floriferis cylindrico-globosis 2-3 cm. longis vel longioribus 2 cm. latis, bracteis late triangularibus 2 mm. longis basi totiusque latis pedicellum amplexantibus, pedicellis 2 mm. longis divaricatis glabris,

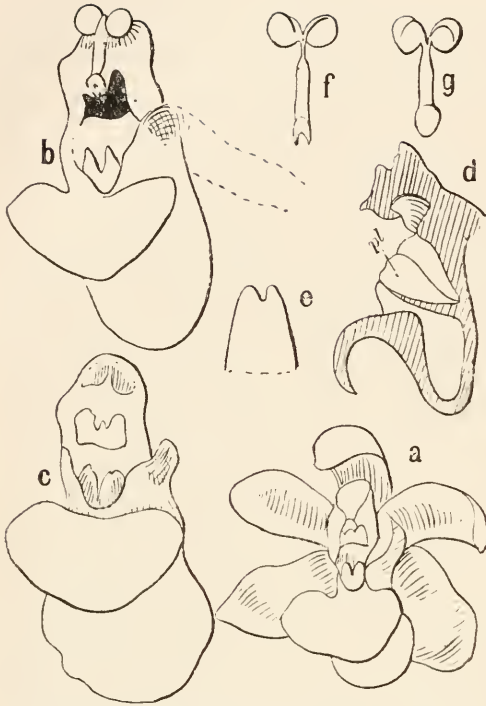


Fig. 49, *Cleisostoma brachybotrya* HAYATA; a, a flower; b, a lip and column; c, the same, anther taken off; d, the same, in vertical section; pl, transversal plate; e, transversal plate at the mouth of the sac; f, g, pollinaria, seen from different sides. shaded portions fig. in a, b and c, show purple coloration.

ovariis 3 mm. longis 1 mm. latis cylindræis. Flores apertientes 6 mm. in diametro; sepala et petala crassa extus viridi-flavescentia intus apice basique purpurascentia; labellum albescens basi utroque latere purpureo-maculatum. Sepalum posticum obovatum 5 mm. longum  $2\frac{1}{2}$  mm. latum 3-nerviū apice obtusum basi  $1\frac{1}{2}$  mm. latum  $\pm$  concavum, lateralia late obovata 4 mm. longa 3 mm. lata apice obtusissima basi 2 mm. lata sub-plana trinervia, nervis vix visis. Petala lineari-spathulata  $4\frac{1}{2}$  mm. longa  $1\frac{1}{2}$  mm. lata apice obtusa basi angustata, nervis haud visis. Labellum basi columnæ affixum basi saccatum, sacco 4 mm. profundo  $2\frac{2}{3}$  mm. lato ore squama posteriore lineari 2 mm. longa apice 2-loba sub-clauso, 3-lobum,

lobis lateralibus ad orem sacci erectis brevioribus, lobo terminali antice patenti desuper recurvo late rotundato vel transverse semi-rotundo apice acuto-obtuso 3 mm. longo 4 mm. lato basi contracto 2 mm. lato. Columna  $1\frac{1}{2}$  mm. longa basi contracta 1 mm. lata apice dilatata  $1\frac{1}{2}$  mm. lata.

HAB. Formosa: loco non indicato: cult. in Taihoku seminario, leg. B. HAYATA Mart. 1914.

**Cleisostoma ionosma** LINDL.; HAYATA Ic. Pl. Formos. II. p. 134.

*Stauropsis luchuensis* ROLFE in Kew Bull. 1907, p. 131.

HAB. Formosa: Kusakusu, leg. B. HAYATA et S. SASAKI, 1912, Juni.

**Cleisostoma oblongisepala** HAYATA (Fig. 50) Ic. Pl. Formos. II.

II. p. 134. Herba epiphytica, radicibus teretibus 3–4 mm. in sectionis diametro, caulibus 25 cm. longis a basi usque ad apicem foliosis teretibus 4–5 mm. in sectionis diametro, vaginis foliorum imbricatis caulem amplexantibus glabris. Folia crassa viridia glabra disticha alterna angustata 10 cm. longa 17 mm. lata apice aristato-acuta basi abrupte contracta ad vaginam abeuntia supra ad costas impressa, supra plana, costis et venis non visis,

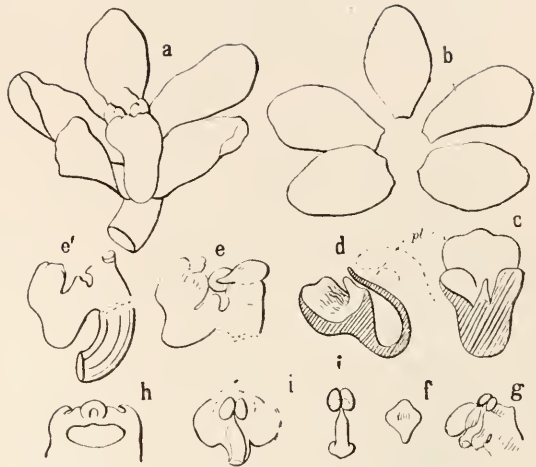


Fig. 50, *Cleisostoma oblongisepala* HAYATA; a, a flower; b, detached sepals and petals; c, a labellum, seen from front, vertical plate is seen; d, the same, seen from side, medially cut; e, column and labellum; f, an anther; g, apical portion of the column, seen from side, pollinarium is seen; h, the same, seen from front, stigma and horseshoe-shaped glands are seen; i, a pollinarium.

basi plus minus tortuosa cum vaginis articulata, margine integra plus minus recurvata, vaginis cylindraceis circ. 3 cm. longis ore truncato-obliquis. Racemi axillares breves 2 cm. longi pauciflorati. Flores apertientes 1 cm. in diametro albicantes centro rubescentes, pedicellis brevibus (cum ovariis) 4 mm. longis triquetris 3-costatis, bracteis brevibus 1–2 mm. longis triangularibus basi dilatatis pedicellum semi-amplectantibus. Sepala: posticum oblongum 7 mm. longum  $4\frac{1}{3}$  mm. latum apice rotundatum concavum, lateralia plus minus obliqua breviora quam postico. Petala obovato-oblonga  $6\frac{1}{2}$  mm. longa  $3\frac{1}{2}$  mm. lata. Labellum plus minus versus apicem rubescens ad columnam adnatum  $4\frac{1}{2}$  mm. longum basi saccatum, (sacco brevi squama postica clauso, squama lineari minute hirtella), 3-lobatum, lobis lateralibus minutis ad latus oris sacci adnatis obtusis dentiformibus, lobo medio erecto emarginato centro mucronato intus hirtellato. Anthera 2 mm. longa antice breve producta. Pollinia 4, per paria conferta, stipite hyalino; Columna apice rubescens 3 mm. longa.

HAB. Botansha, leg. C. OWATARI, 1898. The orchid was brought back to the Koishikawa Garden by Mr. C. OWATARI in his first expedition to Formosa.

**Cleisostoma taiwaniana** HAYATA n. n. (Fig. 51). *Sarcanthus taiwanianus* HAYATA in Mater.

Fl. Formos. p. 337.

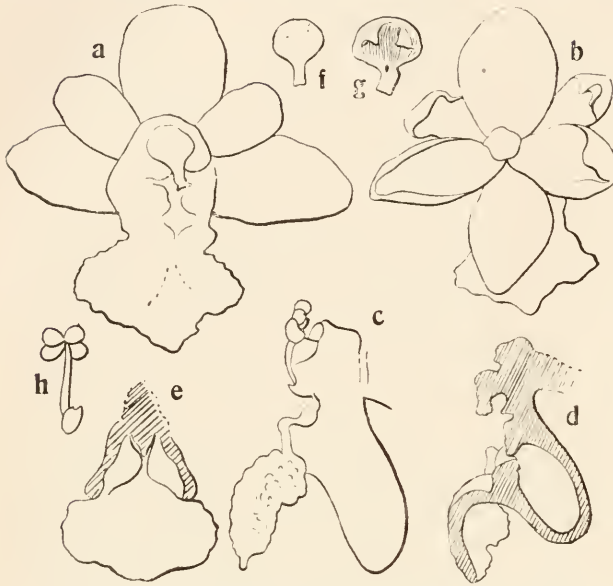


Fig. 51, *Cleisostoma taiwaniana* HAYATA; a, a flower; b, the same, seen from back, ovary taken off; c, a lip and column, seen from side; d, the same, medially cut, anther taken off; e, a lip, detached from columna to show lateral appendages and vertical thickening; f, an operculum, seen from front; g, the same, seen from within; h, pollinarium.

Owing to an erroneous observation, it was first recorded that this orchid has a spur divided by a longitudinal plate and consequently was regarded as a species belonging to *Sarcanthus*. Afterwards, I became aware of that this has no plate but thickenings. It should, therefore, be transferred from *Sarcanthus* to *Saccolabium*.

OBSERV. Herba epiphytica, caulibus

erectis validis teretibus foliatis non pseudo-bulbosis 25 cm. longis, vaginis persistentibus caulem obtegentibus. Folia disticha carnosia plana late linearia 30 cm. longa 4 cm. lata apice oblique emarginata sessilia cum vaginis articulata, vaginis persistentibus 5 cm. longis. Paniculae laterales quasi-axillares validiusculae recurvae ramosae, ramis 5-6 divaricatis validiusculis 4 cm. longis, bracteis minutis squamosis triangularibus. Flores parvi 1 cm. in diametro breve pedicellati flavo-viridescentes intus purpurascens, pedicellis 2-3 mm. longis transverse divaricatis. Sepala libera aequalia patentia carnosula obovato-oblonga 5 mm. longa  $3\frac{1}{2}$  mm. lata apice obtusa. Petala sepalo angustiora 4 mm. longa  $1\frac{3}{4}$  mm. lata apice rotundata postice reflexa. Labellum basi columnae affixum continuum patens basi calcaratum, (calcar breve cylindraceo 3 mm. longo  $1\frac{1}{2}$  mm. lato ore antice lamina longitudinali semi-diviso, ad os postice latereque calloso-appendiculato), 3-lobatum, lobis lateralibus ad



latus calcaris sitis brevibus auriculiformibus, lobo medio latiusculo 3 mm. longo 5 mm. lato seniorbiculari apice rotundato margine denticulato medio late callosoruguloso patenti.

Columna breve oblonga subteres 2 mm. longa.

Clinandrium truncatum.

HAB. Formosa, leg. T. UCHIYAMA, 1899.

*Physurus* RICH.

***Physurus chinensis* ROLFE** (Fig. 52); MATSUM. et HAYATA Enum. Pl. Formos. p. 409.

HAB. Mt. Arisan, leg. B. HAYATA et T. Itô, Mart. 1914.

This orchid drawn in the accompanying figures is perhaps identical with ROLFE's species, so far as the original description is concerned. The type I have never seen.

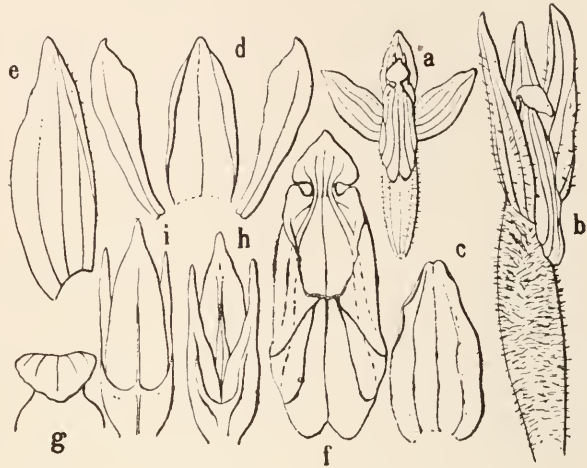


Fig. 52, *Physurus chinensis* ROLFE; a, a flower, slightly expanded; b, the same, seen from side; c, a hood formed by a dorsal sepal and petals; d, the same, separated; e, a lateral sepal; f, a lip, seen from inner side; g, apical portion of the same; h, apical portion of column, seen from front; i, the same, seen from back.

***Anæctochilus* BLUME.**

***Anæctochilus bisaccatus* HAYATA** sp. nov. (Tab. XV.) *Odontochilus bisaccatus* HAYATA in sched. Herb. Taihoku. Terrestis, radices paucae in-crassatae. Caulis cum racemis 20–25 cm. longus teres subglaber, internodiis inferioribus 4 cm. longis, superioribus 2 cm. longis inferiore defoliatus infra medium usque ad basin racemi foliatus suberectus vel ascendens. Folia alterna a se 2 cm. remota petiolata, lamina oblonga  $4\frac{1}{2}$  cm. longa 2 cm. lata apice acuta vel obtuso-acuta ad summum mucronata basi acuta supra atroviridi ad costas albo-lineata subtus sub-pallida, petiolis (vaginibus exceptis) 6 mm. longis gracilibus basi dilatatis ad vaginas expantibus, vaginibus 5–7 mm. longis 4 mm. latis cylindricis hyalinis ore obliquis latioribus, foliis superioribus minoribus in racemis ad bracteas reductis. Racemi hirsuti 5 cm. longi

basi non floriferi, partibus non floriferis  $1\frac{1}{2}$  cm. longis hirsutis, bracteis non floriferis sessilibus lanceolatis basi amplexicaulibus 14 mm. longis 4 mm. latis apice acutis 3-nerviis, bracteis floriferis sub floribus lanceolatis pedicellos amplexantibus margine ciliatis vel hirsutis lanceolatis 12 mm. longis 3 mm. latis, pedicellis cum ovariis 7 mm. longis bractea brevioribus glabris gracilibus 1 mm. in diametro. Flores cinereo-flavescentes. Sepalum posticum late ovatum  $4\frac{1}{2}$  mm. longum 3 mm. latum apice caudato-obtusum ad summum obtusum basi vix contractum 1-nervium, venis non visis, glabrum; sepala lateralia oblique oblonga 6 mm. longa 3 mm. lata apice obtusa basi contracta latere superiore 1 mm. lata, margine sursum interiore recurva, latere inferiore 2 mm. lata margine deorsum prope basin interiore recurva, duo basi se connata saccum 2-lobatum formantia saccum vel calcar labelli involventia 1-nervia utraque pagine glabra. Petala obliqua late semi-ovata 5 mm. longa  $2\frac{1}{2}$  mm. lata apice caudato-obtusa basi breve attenuata basin contracta subfalcato-curva cum sepalo posteriore connata galeam formantia 1-nervia latere exteriori 2 mm. lata latere interiore  $\frac{1}{2}$  mm. lata glabra. Labellum Y-forme perfecte liberum ad basin columnæ adnatum basi saccatum, sacco globoso 2 mm. lato  $1\frac{1}{2}$  mm. longo profunde 2-sacculato (sacculis apice 2-lobatis) basi intus medio posteriore callosis duobus instructo (callis cornuformibus  $1\frac{1}{2}$  mm. longis ascendente-recurvis), latere oris sacci utroque 1-appendiculatum, appendiculis minutis  $\frac{1}{5}$  mm. longis crassis, mesochilo 6 mm. longo lineari margine pectinato, dentibus pectinis utroque latere 3-4-5, superioribus longioribus linearibus 3 mm. longis  $\frac{1}{3}$  mm. latis apice obtusis, medio secus longitudinem 2-lamellato, lamellis linearibus  $\frac{1}{3}$  mm. latis sursum ad lobos laminæ abeuntibus, lamina (epichilo) 2-lobata, lobis oblique obovato-rectangularibus 5 mm. longis 3 mm. latis a se angulo  $50^\circ$  divaricatis apice rotundato-obtusis, sinibus inter lobos triangulari-truncatis. Discus medio mesochili ad medium 1-striatus. Columna brevissima  $\frac{1}{2}$  mm. longa antice 2-appendiculata, appendiculis alæformibus, apice cornuformibus suberectis triangularibus apice obtusis crassiusculis  $\frac{1}{2}$  mm. latis. Clinandrium dorsale profunde concavum. Anthera dorsalis erecta sessilis ovata 2 mm. longa 1 mm. lata apice longicaudata basi cordata. Pollinia 2, singulum clavato-obovatum apice 2-lobatum basi attenuatum ad pseudocaudiculam unam se connatum. Rostellum 2-partitum, (partibus rostriformibus apice cartila-

gineo-acuminatis sub-tortuosis, latere exteriori appendiculatis). Stigma subrostello 2-partitum, partibus subrotundatis subplanis, vel medio sublobato-plicatum. Ovarium cylindricum tortuosum 9 mm. longum  $1\frac{3}{4}$  mm. in diametro glabrum sed minute muricatum.

HAB. Rinkiho, ad 5000 ped. alt., 1911, Aug.

Near *Odontochilus lanceolatus* BENTH. (*Anæctochilus lanceolatus* LINDL. (Orchids of the Sikkim Himalayas, in Ann. Roy. Bot. Gard. Calc. VIII. t. 392); but differs by the shape of the lips and their appendages.

***Anæctochilus formosanus* HAYATA** sp. nov. (Fig. 53). Caulis circ. 20 cm. longus inferiore foliatus glaber. Folia ovata vel rotundato-ovata  $4\frac{1}{2}$  cm. longa 27 mm. lata apice acuta vel acuto-mucronata basi rotundata ad extremitatem subito acuta ad petiolum abeuntia 5-nervia supra velutinoso-nitida eleganter aureo-reticulata subtus (in exsiccatō) rubescentia. Caulis florifer 4–5 cm. longus pauci-floratus, rhachibus hirsutis, bracteis ovato-lanceolatis

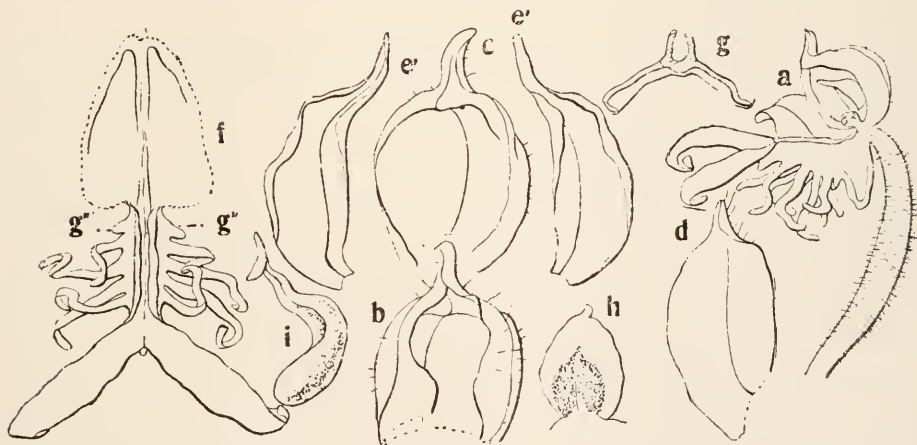


Fig. 53, *Anæctochilus formosanus* HAYATA; a, a flower; b, a hood, formed by a dorsal sepal and two petals; c, a dorsal sepal, e, é, petals; f, a lip; g, a section of a portion mentioned by g' g'' in fig. f; h, an anther, dorsal view; i, a pollinarium.

1 cm. longis concavis basi contractis alabastrum floris amplectantibus extus hirsutis intus glabris, pedicellis nullis, ovariis cylindrico-fusiformibus  $1\frac{1}{2}$  cm. longis ad utramque extremitatem angustatis brevis hirsutis. Sepalum posticum cuspidato-rotundatum 6 mm. longum  $5\frac{1}{2}$  mm. latum dorso hirsutum intus glabrum valde concavum cum petalis connatum galeam formans apice exteriori

reflexum apice cuspidatum, cuspidē 1 mm. longo apice obtuso, margine incurvum 1-nerviū, lateralia ovato-oblonga valde obliqua 8 mm. longa  $4\frac{1}{2}$  mm. lata apice breve cuspidata ad summum obtusa 1-nervia extus hirsuta intus glabra patentia. Petala semi-ovata valde obliqua 7 mm. longa  $2\frac{1}{2}$  mm. lata apice cuspidata, cuspidē 2 cm. longo, 1-nervia cum sepalo postico conniventia galeam formantia. Labellum Y-forme, mesochilo 5-6 mm. longo ad longitudinem plicato subtus medio 1-costato ad costam fimbriis 2-seriatis instructo, fimbriis lineari-filiformibus 5 mm. longis  $\frac{3}{4}$  mm. latis, lamina (epichilo) profunde 2-lobata, lobis lineari-angustatis 7 mm. longis 3 mm. latis apice obtasis divaricatis; calcar sacciforme triangulare 4 mm. longum 3 mm. latum intus prope basin latere anteriore 2-tuberculatum, tuberculis lamelliformibus  $1\frac{1}{2}$  mm. longis  $\frac{1}{2}$  mm. latis obscure denticulatis. Columna brevis 1 mm. longa, anthera oblonga 4 mm. longa.

HAB. Formosa: loco non indicato: cult. in Taihoku seminario, leg. B. HAYATA, 1914, Mart.

Near *A. Roxburghii* LINDL. (Orchids of the Sikkim Himalayas, Ann. Roy. Bot. Gard. Calc. VIII. t. 390); but differs from it by the cream-yellow flowers with more fimbriate mesochils.

**Anæctochilus Inabai** HAYATA sp. nov. (Tab. XVI.) Terrestis; caulis incrassatus 3-4 mm. in diametro teres inferiore glaber, internodiis superioribus 2 cm. longis. Folia 2 cm. a se remota alterna, lamina ovato-oblonga vel oblonga apice acuta vel acuto-acuminata basi rotundata vel rotundato-obtusa  $4\frac{1}{2}$  cm. longa 2 cm. lata glabra, petiolis (vaginis exceptis) 1 cm. longis basi gradatim ad vaginam dilatatis, vaginis 12 mm. longis 4 mm. in diametro ore obliquissimis basi cylindricis, partibus cylindricis brevissimis semihyalinis. Racemi cum pedunculis 13 cm. longi hirsuti, partibus floriferis 5-6 cm. longis, partibus non floriferis (pedunculis) 7-8 cm. longis erectis bracteis 2-3 instructis, bracteis non floriferis lanceolatis hirsutis rubescentibus 1 cm. longis semi-amplexicaulibus, bracteis floriferis sub flore ovato-lanceolatis 1 cm. longis apice acuminatis hirsutis rubescentibus basi  $\pm$  contractis obtusis, pedicellis nullis, ovariis cylindricis vel cylindrico-ovatis 1 cm. longis. Flores rosei. Sepala inæqualia, posticum ovatum vel late ovatum  $5\frac{1}{2}$  mm. longum  $3\frac{1}{2}$  mm. latum apice subcaudato-obtusum ad apicem uncinato-



obtusum basi  $\pm$  contractum 1-nerviū, venis utroque latere nervi 1-2 alternis, fusco-viride sed prope marginem et secus nervos et venas laterales album intus glabrum extus glanduloso-barbatum basi cum petalis connatum galeam formans; sepala lateralia falcato-oblonga 11 mm. longa obliqua  $4\frac{1}{2}$  mm. lata apice acuto-obtusa basi cum basi labelli et se connata. Petala lunuliformia linearia falcato-curva obliqua 7 mm. longa  $1\frac{1}{2}$ - $1\frac{2}{3}$  mm. lata quam sepalo postico vix longiora vel æquilonga apice acuto-obtusa basi vix contracta utraque glabra basi ad sepalum posticum adnata sursum subconnata galeam formantia, saccum labelli involventia intus glabra extus glanduloso-barbata 1-nervia, (venis lateralibus utroque latere nervi 3 alternis acute ascendentibus), fusco-viridia prope marginem secus nervos venasque albo-reticulata. Labellum Y-forme cum hypochilo mesochilo epichiloque 23 mm. longum basi saccatum cum sepalis lateralibus connatum mentum 1-2 mm. longum formans, sacco globoso 3 mm. longo basi leviter 2-lobo, lobis basi interiore callo uno instructis, callis lamelliformibus rectangularibus 1 mm. longis, lamina (epichilo) longe unguiculata, ungue (mesochilo) in ambitu lanceolato-lineari 9 mm. longo 2-3 mm. lato plus minus crassiusculo longe pectinato (dentibus pectinis inferioribus brevibus, superioribus longioribus 7-8 mm. longis angulo  $45^\circ$  antice divaricatis) medio secus longitudinem 2-lamellato, lamellis sursum ad lobos laminæ abeuntibus, lamina (epichilo) alte divaricatim 2-lobata ad sinus inter lobos obtuso-mucronata, lobis divaricatis oblique rectangulari-oblongis 1 cm. longis 5-6 mm. latis apice truncato-obtusis, (sinibus inter lobos rotundato-cuspidatis), margine integra glabra. Columna circ.  $\frac{2}{3}$  mm. longa  $\frac{1}{2}$  mm. lata dorso complanata; anthera dorsalis verticaliter sita (posterior) cordato-ovata 3 mm. longa 2 mm. lata apice caudato-acuta basi subcordata sessilis 2-locularis; pollinia 2, bipartita vel apice 2-lobata cum pseudocaudicula 4 mm. longa clavato-obovata, pseudocaudicula 1 tortuoso  $1\frac{1}{2}$  mm. longa, glandula oblonga  $\frac{1}{2}$  mm. longa. Clinandrium valde concavum latere ad rostellum abeuns; rostellum subcartilagineum rotundatum apice aristato-2-lobatum; stigma duo, singulum circ. connatum vel distans infra rostellum situm, appendiculis columnæ 2 cornuformibus infra stigma sitis ascendentibus crassis 1 mm. longis obtusis. Ovarium sessile cylindricum 9 mm. longum 2 mm. in diametro hirsutum.

*Odontochilus Inabai* HAYATA (Herb. Taihoku).

HAB. Rinkiho, ad 5000 ped. alt., leg. H. INABA, Aug. 1911, fl. 1933i, (fide INABA).

Near *Odontochilus grandiflorus* BENTH. = *Anæctochilus grandiflorus* LINDL. (Orchids of the Sikkim Himalayas, in Ann. Roy. Bot. Gard. Cale. VIII. t. 393), but differs from it by the much longer pectinate claws of the lips and in having hairy sepals.

**Anæctochilus koshunensis** HAYATA sp. nov. (Fig. 54). Radices incrassatæ. Caulis teres solitarius (cum racemis) 16 cm. longus basi 3 mm. crassus a basi usque ad medium foliatus supra medium vaginato-squamatus sursum spicatum florifer simplex incrassatus rubro-purpurascens (in exsiccatō) deorsum subglaber sursum pubescens prope basin minus foliatus, prope medium approximativ foliatus, supra medium usque ad apicem aphyllus. Folia alterna ad medium caulis approximativ 3-4 sita petiolata, lamina rotundato-ovata  $2\frac{1}{2}$  cm. longa 18 mm. lata apice obtuso-acuta mucronatim acuta basi rotundata ad petiolum acuta margine integra crassiuscula utraque pagine glabra in exsiccatō membranacea supra in exsiccatō fuscenti subtus rubro-purpurascenti 5-nervia, nervis parallelis lateralibus infra apicem ad nervum centralem attingentibus, venis et venulis reticulatis, supra ad nervos venas venulasque albo-reticulata, petiolis cum vaginis 1 cm. longis linearibus, partibus linearibus 5 mm. longis 1 mm. latis plicatis paullo pubescentibus, vaginis 3-5 mm. longis ore oblique truncatis 5 mm. latis circ. 10-nerviis semi-hyalinis rubescentibus. Spicæ simplices 5-6-floratæ  $4\frac{1}{2}$  cm. longæ, pedunculis (partibus caulis aphyllis) 7 cm. longis 2-3 bracteatis, bracteis sub flore ovatis rubescentibus 7 mm. longis 3-4 mm. latis apice cuspidato-acuminatis 1-nerviis alabastrum floris amplectantibus intus glabris extus pubescentibus. Flores alterni breve pedicellati vel subsessiles suberecti. Sepala inæqualia; posticum late rotundato-ovatum 5 mm. latum totiusque longum basi non contractum apice cuspidatum ad summum obtusum intus glabrum extus pubescens 1-nervium intus valde concavum sursum valde reflexum cum petalis connatum galeam formans dorso ad nervum elevatum; lateralia oblique oblonga plus minus patentia 8 mm. longa 4 mm. lata valde concava oblique apice obtusa basi non contracta 1-nervia, nervis recurvis, intus glabra extus pubescentia rubescentia, nervis

dorso elevatis ascendentibus. Petala tenuissima hyalina valde obliqua semi-obovata apice cuspidato-acuta basi attenuato-contracta sursum reflexa latere superiore cum sepalis adnata galeam formantia valde obliqua latere inferiore  $2\frac{2}{3}$  mm. lata latere superiore  $1\frac{1}{6}$  mm. lata 6 mm. longa 1-nervia utraque pagine glabra. Labellum glabrum basi ad basin columnæ adnatum longe calcaratum (calcarei ad orem valde obliquo latere posteriore 5 mm. longo latere anteriore 9-10 mm. longo medio 2 mm. lato intus latere posteriore infra columnam proboscis 2 instructo deorsum antice plus minus recurvo ad apicem 2-lobato, lobis 2 mm. longis

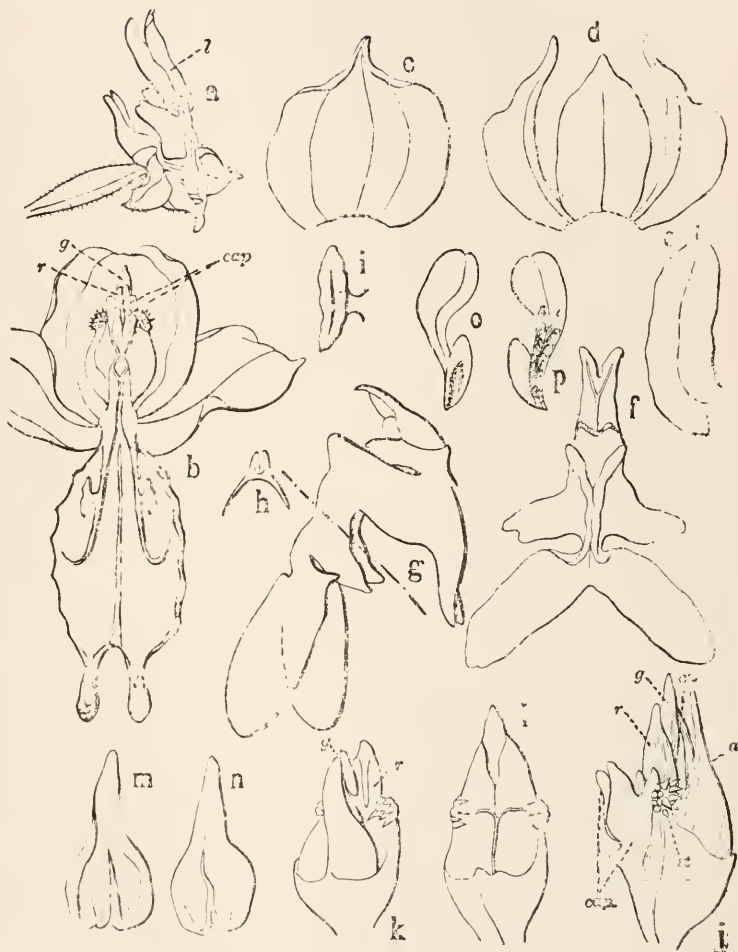


Fig. 54, *Anaclochilus kosshunensis* HAYATA; a, a flower; b, another flower, lamina of the lip taken off, spur explicated, to show columnæ, columnal appendages, stigmata, rostellum, gland and two basal appendages of the spur; c, a dorsal sepal and petals, connated into a hood; d, a dorsal sepal and petals, separated; e, a lateral sepal; f, a detached lip, seen from face; g, the same lip, with column and anther, seen from side; h, cross section of the same at chain-line; i, a basal appendage of the spur; j, a columnæ, seen from side; k, the same, seen from back; l, the same, anther taken off, showing clinandrium; m, an anther, seen from front; n, the same, seen from back; o, pollinarium, seen from face; p, the same, seen from back.

l=lip; cap=columnal appendages; r=rostellum; g=gland; cd=caudicle of pollinia; a=anther; st=stigma.

1 mm. latis apice obtusis rectis, versus orem antice utroque latere lobis erectis triangularibus instructum (lobis acutis latere anteriore ad mesochilum abeuntibus), mesochilo a calcaris angulo  $90^\circ$  egresso 3–4 mm. longo secus medium plicato margine conduplicato-plicato subtus secus longitudinem appendiculis 2 instructo, appendiculis late pinni-formibus 4 mm. longis 2 mm. latis apice antice obtusis desuper falcatis, lamina (epichilo) bipartita, partibus verticaliter sitis parallelis oblique oblongis 8 mm. longis  $3\frac{1}{4}$  mm. latis apice rotundatis vel obtusis, ad sinus inter partes distincte mucronata, mucrone desuper reflexo. Columna a basi usque ad apicem rostellii 3 mm. longa basi constricta latere anteriore appendicibus instructa, appendicibus anterioribus 2 alaeformibus, alis verticalibus parallelis apice 2-lobatis, lobis superioribus magnis triangularibus 1 mm. latis intus sacciforme excavatis, lobis inferioribus minoribus; appendices columnæ apice liberae sub rostelllo rostelliformes; stigmata 2 distantia utroque latere basi rostellii sita; rostellum cartilagineum validum 2-fidum 1 mm. longum; anthera dorsalis erecta sessilis lanceolato-ovata 4 mm. longa  $1\frac{1}{2}$  mm. lata apice rostrato-attenuata basi rotundata leviter 2-lobata 2-locularis; pollinia 2 sectilia obovato-lanceolata basi longe attenuata ad caudiculas abeuntia; glandula fusiformis, ad utramque extremitatem acuta  $1\frac{1}{4}$  mm. longa  $\frac{1}{2}$  mm. lata; clinandrium profunde excavatum. Ovarium fusiforme a lamina labelli angulo  $90^\circ$  egressum 12 mm. longum 4 mm. latum pubescens utrinque contractum basi plus minus attenuatum sessile vel brevissime pedicellatum.

HAB. Kōshūn.

Differs from all the species of *Anectochilus* by the mesochil which is not afforded with pectinate lobes, but has broadly entire wingformed lobes, by the columnal appendages which are doubly folded and beak-shaped at the apex, and by the triangular lateral lobes at the mouth of the spurs. It may constitute a new genus (*Aviglossum*, I should propose to call it), when the above mentioned characters are fully ascertained by the study of a living material.

### *Zeuxine* LINDL.

***Zeuxine arisanensis*** HAYATA sp. nov. (Fig. 55). Terrestis; radices paucae incrassatae. Caulis cum racemo terminali 25 cm. longus supra basin usque ad infra medium foliatus. Folia in exsiccatu tenuiter membranacea



ovata vel ovato-lanceolata apice acuta basi obtuso-rotundata ad petiolum contracta 4 cm. longa  $1\frac{1}{2}$  cm. lata, petiolis (cum vaginis)  $1\frac{1}{2}$  cm. longis basi dilatatis vaginiformibus caulem amplexantibus. Partes floriferæ 6 cm. longæ, partibus inter floriferam et foliiferam 11 cm. longis hirsutis squamatis, squamis  $1\frac{1}{2}$  cm. longis apice acuminatis basi vaginiformibus caulem amplexantibus a se 3 cm. remotis subrubris tenuiter scariosis. Flores densiuscule dispositi lineari-ovoidei 8 mm. longi  $2\frac{1}{2}$  mm. lati hirsuti, bracteis lanceolatis. Sepalum posticum valde concavum ovatum 5 mm. longum apice acuto-obtusum basi leviter contractum 1-nerviū vel obscure 3-nerviū extus hirsutum intus gla-

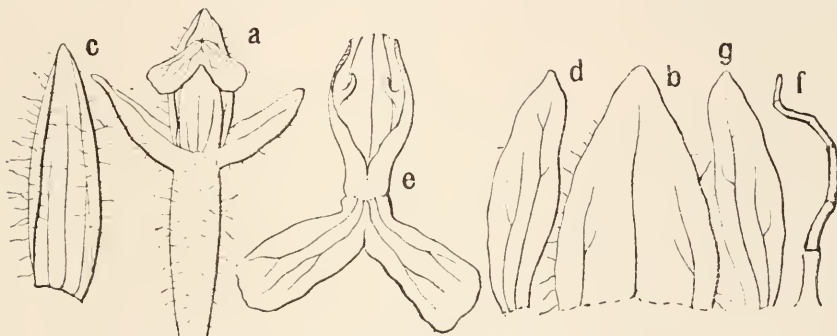


Fig. 33, *Zeuxine arisanensis* HAYATA; a, a flower; b, a dorsal sepal, expanded; c, a lateral sepal; d, d', petals; e, a lip; f, a hair on the flower.

brum cum petalis connatum galeam formans, lateralia oblique ovata 4 mm. longa 2 mm. lata apice acuto-obtusa interiore recurva basi  $\pm$  contracta extus hirsuta intus glabra 1-nervia vel obscure 3-nervia. Petala semi-oblonga  $4\frac{1}{2}$  mm. longa  $1\frac{2}{3}$  mm. lata apice obtusissima basi leviter contracta 1-nervia, nervo valde excentrico, utraque pagine glabra. Labellum Y-forme, lamina tenuis 2-lobata, lobis angulo  $70^\circ$  a se divaricatis quadrangularibus apice obtusis  $2\frac{1}{3}$  mm. longis 1 mm. vel  $1\frac{1}{2}$  mm. latis, ungue crasso 1 mm. lato deorsum latiore cum columna connato tubum breve formanti margine intus carinato basi intus 2-tuberculato 3 mm. longo. Columna 1-2 mm. longa. Rostellum alte 2-lobatum, lobis linearibus 1 mm. longis.

HAB. Arisan, leg. S. SASAKI, Mart., 1911.

Near *Zeuxine reflexa* KING et PANTLING (Orchids of the Sikkim Himalayas in Ann. Roy. Bot. Gard. VIII. t. 388), but differs from it by the shape of the columnal appendages.

*Cheirostylis* BLUME.

***Cheirostylis Inabai* HAYATA** sp. nov. (Fig. 56). Caulis ascendens 10–15 cm. altus tota longitudine foliatus, foliis inferioribus minoribus iis superioribus majoribus. Folia ovata 2 cm. longa 12 mm. lata apice acuta vel obscure mucronato-acuta basi rotundata subito ad petiolum abeuntia a se 2 cm. remota in

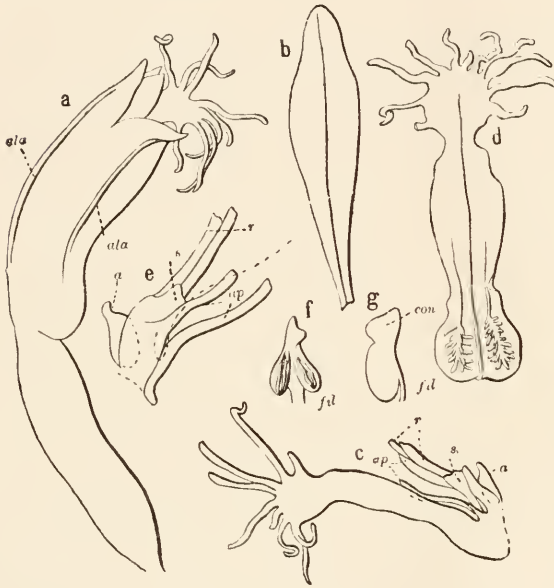


Fig. 56, *Cheirostylis Inabai* HAYATA; a, a flower; b, a petal; c, a flower, sepals and petals taken off; d, a lip; e, column; f, an anther, seen from face; g, the same, seen from side; a = anther, r = rostellum, ap. = columnal appendages, s = stigma, ala = wings, fil = filament.

exsiccatu tenuiter membranacea, petiolis  $1\frac{1}{2}$  cm. longis apice 2 mm. latis deorsum dilatatis prope basin vaginiformibus, partibus vaginiformibus 5 mm. longis totiusque latis. Flores pauciracemosi, racemis terminalibus simplicibus 2–3 cm. longis, pedunculis (partibus non floriferis) 1 cm. longis breve hirsutis, bracteis ovato-lanceolatis 8 mm. longis 2 mm. latis apice acuminatis, pedicellis hirsutis 2 mm. longis, ovariis cylindricis 1 cm. longis 2 mm. latis. Flores albi oblique cylindracei subdeclinati 1 cm. longi

(ovariis exceptis) 4 mm. lati apice  $\pm$  angustiores basi rotundato-contracti. Sepala lineari-lanceolata 1 cm. longa  $2\frac{1}{2}$  mm. lata medio dorso carinato-alata ad marginem a basi usque ad prope apicem connata tubum formantia, tubo subdeclinato basi antice obscure vel vix ventricoso apice 3-lobato lobis oblongo-triangularibus 3 mm. latis apice acutis. Petala lineari-spathulata 10 mm. longa  $2\frac{1}{2}$  mm. lata apice obtusa deorsum attenuata tenuissima subhyalina erecta sublibera sursum  $\pm$  sepalo postico adnata 1-nervia. Labellum erectum clavato-angustatum circ. 10 mm. longum apice a tubo sepalorum exsertum sursum supra medium contractum, parte supra contractionem rotundata 2 mm. in dia-

metro crassiuscula supra minute villosa margine fimbriata, fimbriis  $2\frac{1}{2}$  mm. longis, ad contractionem  $1\frac{1}{2}$  mm. latum, parte infra contractionem angustata 8 mm. longa 2 mm. lata lævi basi subventicosa, ventriculo sub 2-lobato intus 3-nervio ad nervos laterales fimbriis 2-seriatis instructo. Columna circ. 1 mm. longa; appendiculæ columnales lineares, partibus liberis 3 mm. longis  $\frac{1}{2}$  mm. latis. Rostellum alte 2-partitum, partibus linearibus  $3\frac{1}{2}$  mm. longis  $\frac{1}{2}$  mm. latis apice truncatis.

HAB. Rinkoho, ad 5000 ped. alt., leg. H. INABA, Aug., 1911.

Near. *Cheirostylis chinensis*, but differs from it by the much larger leaves which are arranged from the base of the stems to the base of the peduncles.

*Arisanorchis* HAYATA n. g.

Sepala membranacea a basi usque ad prope apicem in tubum coalita subæqualia  $\pm$  declinata basi antice in saccum brevissimum producta. Petala sursum sepalo postico adnata deorsum libera. Labellum a basi columnæ erectum angustum petalo conforme elongato-oblongum circ. æquilatum apice non dilatatum intus non callosum ecalcaratum apice desuper leviter recurvum. Columna brevis apice brachio uno vel brachiis 2 erectis linearibus rostello æquilongis appendiculata. Stigmata distantia utroque latere basis rostellī sita. Rostellum alte 2-partitum, partibus acuminatis erectis. Clinandrium breve profunde excavatum. Anthera erecta acuminata 2-locularis, loculis se separatis. Pollinia sectilia, caudicula oblanceolata glandula lineari peltata inter partes rostellī sita. Herba aphylla terrestris debilis. Rhizoma repens tuberiferum. Scapi aphylli vaginis instructi simplices erecti. Flores parvuli in racemo laxiusculo dispositi breviter pedicellati.

HAB. Formosa. Species unica.

The new genus is more or less related to *Gastrodia*, *Aphyllorchis*, *Epipogon* and *Galera*, in its leafless habit. It is, however, closely allied to *Cheirostylis* in the gamophyllous perianth, deeply sinuate rostellum, sectile pollinia, one or two armed columnal appendages and stigmatic tissue at the base on each side of the rostellum. But it differs from it by the aphyllous habit, and by the nearly included long entire labellum with no distinction of a blade and claw and with no swelling at the base.

**Arisanorchis Takeoi** HAYATA, n. sp. (Fig. 57). Terrestis, tuberibus oblongo-ovoideis horizontaliter sitis circ. 1 mm. longis 5 mm. in diametro carnis flavescenti-rubrescentibus singulis vel moniliforme continuis, apice scapum singulum emittentibus. Scapi erecti recti circ. 15 cm. longi aphylli fulvo-albescentes

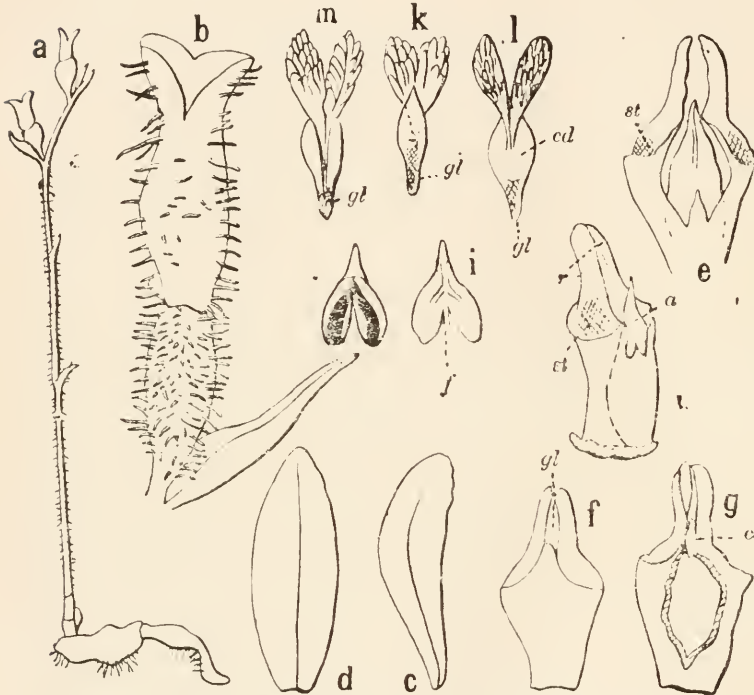


Fig. 57, *Arisanorchis Takeoi* HAYATA; a, the plant; b, a flower; c, a petal; d, a lip; e, a column, seen from front; f, the same, seen from back; g, the same, seen from back, anther and dorsal portion of the clinandrium taken off; h, the same, seen from side; i, an anther, seen from back; j, the same, seen from front; k, pollinarium; l, and m, the same, seen from another side; n, columnal appendage; o, caudicle; p, filament; q, gland; r, rostellum; s, stigma; fig. a, natural size; others more or less magnified.

squamati, (squamis tenuissimis vaginiformibus a se 2-3 cm. remotis hyalinis circ. 1 cm. longis cylindricis, ore late obliquis apice acutis), tenuiter pilosi, pilis tenuissimis patentibus crispis, partibus floriferis 2 cm. longis, floribus generaliter 2-3 a se 1 cm. remotis subsecundis, pedicellis (exceptis ovariis) 3 mm. longis, bracteis sub pedicello lanceolatis semi-

hyalinis 6-7 mm. longis. Flores subalbi vel pallido-flavi, ovariis viridibus toto glanduloso-pilosis, pilis reflexis tenuissimis. Sepala toto connata tubum formantia toto tenuiter pilosa, tubo  $6\frac{1}{2}$  mm. longo  $2\frac{1}{2}$  mm. in diametro  $\pm$  declinato basi subito constricto ad orem leviter contracto, ore 2 mm. in diametro, basi anteriore plus minus minute saccato, (sacco obscuro vel  $\frac{1}{2}$  mm. pro ducto), apice 3-lobato, lobo postico (sepalo postico) triangulari  $2\frac{1}{2}$  mm. longo



totiusque lato apice obtuso, lobis lateralibus postico minus latis conformibus. Petala sublibera oblique oblanceolata 6 mm. longa  $1\frac{1}{2}$  mm. lata apice obtusa basi  $\frac{1}{3}$  mm. lata ~ formiter falcata basi gradatim angustata. Labellum elongato-oblongum 6 mm. longum 2 mm. latum subinclusa subrecta suberecta sursum prope apicem desuper recurva apice obtusa basi 1 mm. lata. Columna 2 mm. longa. Clinandrium profunde excavatum; anthera bilocularis erecta apice cuspidato-appendiculata, loculis fusiformibus. Rostellum erectum 2-lobatum, lobis linearibus  $1\frac{1}{2}$  mm. longis a glandula lanceolata separatis. Pollinia 2 sectilia (granulis cuneiformibus  $\frac{1}{3}$  mm. longis) fusiformia, medio caudiculæ peltatim affixa, caudicula oblanceolata  $2\frac{1}{2}$  mm. longa  $\frac{1}{2}$  mm. lata apice obtusa basi attenuata flava hyalina; glandula lactacea linearis 1 mm. longa; stigmata lateralia basi utroque latere rostellum sita. Columna antice plana non alata, sed apice antice cum appendiculis simplicibus vel 2-partitis instructa, partibus linearibus secus rostellum productis 1 mm. longis rectis erectis.

HAB. Arisan: inter Karapin et Suisharyō, ad 3300 ped. alt., leg. TAKEO ITō, Mart. 28, 1914.

Found on a sunny place, growing in a clumps of *Kalanchoe spathulata*, apparently with some indirect connections with the latter.

***Goodyera* R. Br.**

***Goodyera bilamellata*** HAYATA sp. nov. (Fig. 58). Caulis 15 cm. longus basi foliatus sursum racemosus. Folia oblongo-lanceolata 5 cm. longa 18 mm. lata apice acuta basi subito acuminata attenuata ad petiolum abeuntia chartaceo-membranacea in exsiccatō margine subintegra vel minute crispata, petiolis 4 cm. longis basi vaginato-dilatatis caulem complete amplexantibus. Caules sursum hirsuti, partibus floriferis 5 cm. longis, floribus sessilibus a se 5 mm. remotis, bracteis lanceolato-ovatis 1 cm. longis 4 mm. latis apice acuminatis basi cuneato-angustatis extus hirsutis intus glabris 1-nerviis, ovariis 6 mm. longis tortuosis hirsutis. Sepalum posticum ovato-triangulare 9 mm. longum basi latissimum 4 mm. latum apice triangulari-acutum ad summum obtusum margine prope apicem interiore recurvum 1-nerviū concavum cum petalis galeam formans extus hirsutum, lateralia oblonga obliqua 1 cm. longa  $3\frac{1}{2}$  mm. lata 1-nervia sursum convoluta acuminata ad summum obtusa. Petala

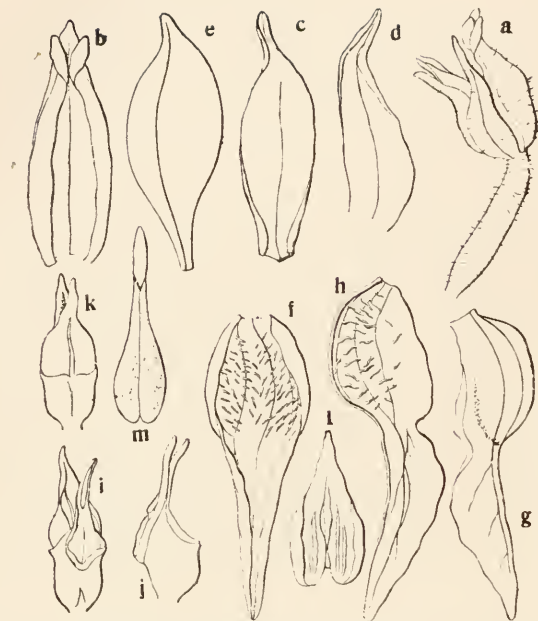


Fig. 58, *Goodyera bilamellata* HAYATA; a, a flower; b, a cap composed of a dorsal sepal and petals; c, a dorsal sepal; d, a lateral sepal; e, a petal; f, a lip, seen from front; g, the same, seen from side; h, the same, in vertical section; i, a column; j, the same, seen from side; k, the same, seen from back; l, an anther; m, pollinarium.

obovato - spathulata 1 cm. longa 3-4 mm. lata apice breve cuspidata obliqua basi cuneato-attenuata 1-nervia utraque pagine glabra. Labellum oblongum 8-9 mm. longum basi ventricosum, ventriculo extus glabro intus hirsuto, pilis 1 mm. longis, 4 mm. longo 3 mm. lato, sursum secus longitudinem plicatum, parte plicata utraque facie glabra 5-nervia explicato ovata 4 mm. longa 3 mm. lata discis 2-lamellatis instructa apice ad marginem recurva subacuta ad summum obtusa. Columna brevis, anthera cordato-ovata apice attenuata 4 mm. longa. Ros-

tellum bipartitum, partibus linearibus rectis 2 mm. longis.

HAB. Arisan, leg. B. HAYATA et S. SASAKI, Jan., 1912.

***Goodyera caudatilabella* HAYATA sp. nov. (Fig. 59).** Caulis 40-50 cm. longus basi vaginatus medio foliatus sursum racemosus. Folia oblongo-obovata circ. 20 cm. longa 6 cm. lata apice acuta basi attenuata ad petiolum 5 cm. longum abeuntia, ventulis transversis manifeste reticulatis, in exsicato membranacea, petiolis 5 cm. longis basi dilatatis vaginiformibus, vaginis 1-2 cm. longis 13 mm. latis. Caulis inter partem racemosam et foliosam squamatus, partibus squamigeris 17 cm. longis hirsutis, squamis triangulari-lanceolatis linearibus 14 mm. longis 2 mm. latis, partibus racemosis 20 cm. longis, floribus inferioribus remotis a se 1 cm. remotis, superioribus densiusculis, bracteis lineari-lanceolatis 1 cm. longis 1-2 mm. latis, pedicellis subnullis,

ovariis 8 mm. longis dense brevique crispato-hirsutis, pilis glandulosis. Sepalum posticum oblongum 6 mm. longum 3 mm. latum apice acutum margine plus minus recurvum cum petalis galeam formans 3-nervium extus glanduloso-hirsutum intus glabrum; sepala lateralibus valde concava  $6\frac{1}{2}$  mm. longa 3 mm. lata extus hirsuta intus glabra. Petala spathulata 6 mm. longa 2 mm. lata  $\pm$  obliqua apice triangulari-obtusa medio deorsum  $\frac{2}{3}$  mm. lata attenuata utraque glabra. Labellum valde concavum late rotundatum 5 mm. longum apice longe caudatum, caudis linearibus  $1\frac{1}{2}$  mm. longis  $\frac{1}{2}$  mm. latis apice desuper recurvis vel convolutis, extus glabrum intus breve glanduloso-hirsutum. Columna 3 mm. longa apice 1 mm. lata basi angustior. Rostellum triangulare 1 mm. longum  $1\frac{1}{2}$  mm. latum; anthera oblongo-triangularis  $1\frac{2}{3}$  mm. longa  $1\frac{1}{3}$  mm. lata.

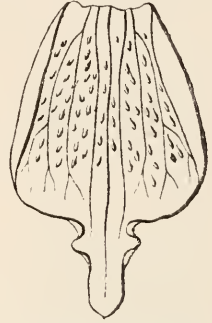


Fig. 59, *Goodyera caudatilabella* HAYATA.

HAB. INS. OKINAWA, leg. Y. TASHIRO, 1887, Mart. fl.

Near *G. procera*; but differs from it by the short rostellum and long caudate lips.

**Goodyera cyrtoglossa** HAYATA sp. nov. (Fig. 60) Caulis 80–100 cm. longus inferiore 7 mm. latus deorsum vaginatus medio foliatus sursum ramosus, partibus foliatis 20 cm. longis. Folia oblonga vel oblongo-lanceolata 15 cm. longa 5 cm. lata apice acuminata basi acuminata ad petiolum abeuntia in exsiccato submembranacea, petiolis 7–8 cm. longis basi dilatatis vaginatis, vaginis 1–2 cm. longis 13 mm. latis, partibus inter partem floriferam et ramosam squamiferis, squamis lanceolatis 3 cm. longis 1 cm. latis caulem amplexantibus, partibus floriferis 15 cm. longis, rhachibus dense brevique pilosis, bracteis lanceolatis 1 cm. longis 2 mm. latis apice lineari-acuminatis, pedicellis subnullis, ovariis 1 cm. longis dense brevique pilosis, pilis brevibus crispatis. Sepalum posticum ovato-lanceolatum 7 mm. longum  $2\frac{1}{2}$  mm. latum extus breve hirsutum intus glabrum subtrinervium, nervis lateralibus tenuissimis; sepala lateralibus quam postico paullo longiora et latiora  $\pm$  obliqua. Petala spathulato-linearum 9 mm. longa 1 mm. lata apice obtusa vel rotundata medio deorsum attenuata basi  $\frac{1}{3}$  mm. lata. Labellum late rotundatum apice caudatum, parte

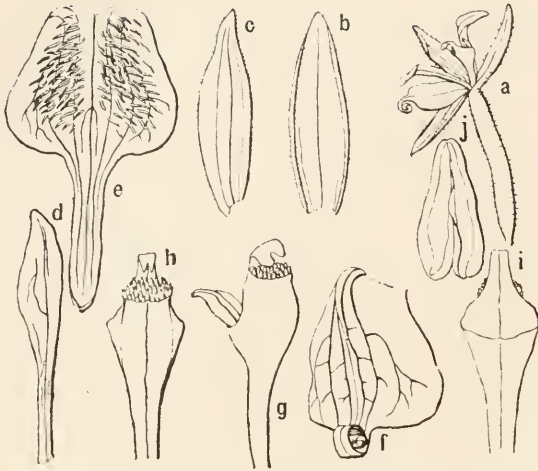


Fig. 60, *Goodyera cyrtoglossa* HAYATA; a, a flower; b, an uppermost sepal; c, a lateral sepal; d, a petal; e, a lip; f, the same, seen from back; g, a column, seen from side; h, the same, seen from front; i, the same, seen from back, anthers taken off, showing clinandrium; j, an anther, seen from front.

rotundata valde concava 3 mm. longa  $3\frac{1}{2}$  mm. lata, parte caudata lineari  $2\frac{1}{2}$  mm. longa  $\frac{1}{2}$  mm. lata apice interiore desuper convoluta. Columna 4 mm. longa  $\frac{1}{2}$  mm. lata apice dilatata  $1\frac{1}{3}$  mm. lata; rostellum triangulare  $1\frac{1}{2}$  mm. longum 1 mm. latum apice 2-aristato-lobatum; anthera ovato-oblonga 2 mm. longa 1 mm. lata.

HAB. Kappanzan, leg. U. MORI et Y. SHIMADA, Mart. 1910, (fl.).

Near *G. procera*, but differs by the long curled tails

at the apex of the lips, and by much smaller flowers.

***Goodyera longibracteata* HAYATA sp. nov.** (Fig 61, a-h). Caulis 50 cm. longus basi vaginatus deorsum infra medium foliatus. Folia oblique ovato-oblonga vel obovato-oblonga 12 cm. longa  $5\frac{1}{2}$  mm. lata apice breve acuminata ad summum breve aristata basi subito attenuata ad petiolum abeuntia, petiolis (cum vaginis) 6 cm. longis subplicatis basi dilatatis ad vaginam (partem dilatatam) abeuntibus, vaginis 3 cm. longis 8 mm. latis nervosis; caulis partes foliosae 10 cm. longae; partes floriferae 14 cm. longae; partes inter partem floriferam et foliatam 18 cm. longae squamatae, squamis 3 cm. longis lineari-lanceolatis caulem amplectantibus. Racemi laxi vel denseque floriferi, bracteis lineari-lanceolatis 15 mm. longis 3 mm. latis apice acuminatis florem superantibus, rhachibus et ovariis brevissime puberulis, ovariis (pseudopedicellis) 8 mm. longis linearibus. Sepalum posticum elongato-oblongum  $7\frac{1}{2}$  mm. longum  $2\frac{1}{2}$  mm. latum apice obtusum basi leviter contractum  $1\frac{1}{2}$  mm. latum margine sursum apiceque interiore recurvum 3-nerviū dorso breve hirsutum facie glabrum, lateralia cum postico aequiformia sed  $\pm$  obliqua latiora 3 mm. lata. Petala spathulato-lineararia 7 mm.



longa  $1\frac{1}{2}$  mm. lata apice obtusa medio deorsum cuneato-attenuata basi  $\frac{1}{3}$  mm. lata 1-nervia. Labellum cuspidato-rotundatum 6 mm. longum explicato  $5\frac{1}{2}$  mm. latum apice caudatum, (cauda lineari-oblonga 2 mm. longa  $1\frac{1}{3}$  mm. lata apice obtusa basi contracta plana antice recurva), sub cauda usque ad basin ventricosum, ventriculo 4 mm. longo  $2\frac{1}{2}$  mm. lato extus glabro intus piloso (pilis  $\frac{2}{3}$  mm. longis) crasso ad marginem membranaceo. Columna (exceptis antheris et rostellis) 3 mm. longa; rostellum profunde 2-lobum, lobis lineari-triangularibus 2 mm. longis  $\frac{1}{2}$  mm. latis; anthera triangulari-lanceolata 3 mm. longa  $1\frac{1}{2}$  mm. lata apice acuminata.

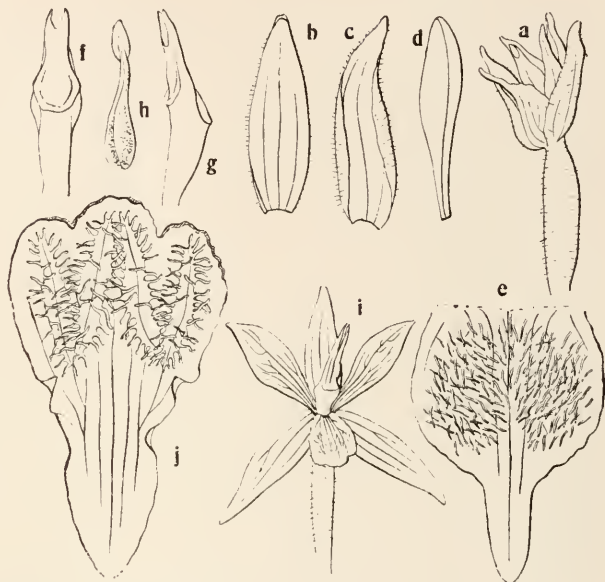


Fig. 61, *Goodyera longibracteata* HAYATA; a, a flower; b, a dorsal sepal; c, a lateral sepal; d, a petal; e, a lip, expanded; f, a column, seen from front; g, the same, seen from side; h, pollinarium; i-j, *Goodyera longirostrata* HAYATA; i, a flower, sepals and petals, expanded; j, a lip, expanded.

HAB. Kusukusu, leg. Y. TASHIRO, 1913, Jan. fl.

Very near *G. cyrtoglossa* HAYATA; but differs from it by the shorter tail at the apex of the lips and erect rostellum. In *G. cyrtoglossa* HAYATA, the rostellum is always curved forwards at the apex. Also near *G. foliosa* BENTH. (Orchids of the Sikkim Himalayas in Ann. Roy. Bot. Gard. Cal. VIII. t, 374), but differs from it by the much narrower lanceolate petals.

**Goodyera longirostrata** HAYATA sp. nov. (Fig. 61, i-j). Caulis basi repens ad nodos radicans, radicibus semper solitariis, internodiis 2-3 cm. longis ad nodos reliquis foliorum instructis, a basi sursum erectus 20 cm.

altus, basi foliatus sursum racemosus. Folia ovato-oblonga  $6\frac{1}{2}$  cm. longa 3 cm. lata apice acuta basi rotundata subito ad petiolum abeuntia margine integra in exsiccatō membranacea, petiolis 4 cm. longis basi dilatatis vaginiformibus caulem complete amplexantibus, partibus dilatatis 2 cm. longis. Racemi pauciflorati, rhachibus dense molleque hirsutis, bracteis angustato-oblongis 3-nerviis 2 cm. longis 6 mm. latis apice acuminatis margine ciliolatis, floribus sessilibus, ovarii  $1\frac{1}{2}$  cm. longis. Sepala subæqualia angustato-oblonga  $1\frac{1}{2}$  cm. longa 6 mm. lata apice acuta 3-nervia utraque facie glabra, posticum cum petalis galeam formans. Petala cuneato-oblanœolata  $1\frac{1}{2}$  cm. longa 6 mm. lata apice triangulari-acuta basi cuneato-attenuata  $\pm$  obliqua 1-nervia, venis lateralibus obscuris. Labellum basi  $\pm$  saccatum explicato ovatum  $1\frac{1}{2}$  cm. longum 8 mm. latum apice late cuspidato-acutum, sacco intus dense piloso, (pilis longiusculis plus 1 mm. longis apice glanduliferis), multinerviū. Columna brevis 2 mm. longa. Rostellum lineare 7 mm. longum 2-partitum, partibus linearibus 6 mm. longis 1 mm. latis apice acuminatis. Pollinia cuneato-linearia 9 mm. longa.

HAB. Akōchō: Buisan, ad 7000 ped. alt., leg. S. SASAKI.

**Goodyera morrisonicola** HAYATA (Tab. XVII.) Mater. Fl. Formos. p. 343. Caulis basi inferne radicans superne ascendens 10 cm. longus, tota longitudine foliatus. Folia alterna petiolata ovata vel ovato-oblonga 3 cm. longa  $1\frac{1}{2}$  cm. lata apice acuta basi rotundata margine minute crispata 3-5 nervia, petiolis  $1\frac{1}{2}$  cm. longis a medio deorsum dilatatis caulem amplexantibus. Scapi terminales 4 cm. longi laxè florati pubescentes, bracteis lanceolatis acuminatis 1 cm. longis basi 4 mm. latis florem subamplexantibus. Sepala subæqualia libera, posticum erectum concavum oblongo-angustatum 1 cm. longum  $3\frac{1}{2}$  mm. latum apice obtusum cum petalis angustis in galeam connivens, lateralia libera erecta. Petala oblonga 11 mm. longa 3 mm. lata apice obtusa basi attenuata. Labellum ad basin columnæ sessile plicato-incurvo-ascendens 8 mm. in longitudine basi subsaccatum, (sacco intus villosō apice recurvo-obtusō), margine integrum, apice dentibus lateralibus brevibus. Columna brevis 1 mm. longa apice longe 2-cornuta, cornibus  $3\frac{1}{2}$  mm. longis. Anthera erecta ovato-lanceolata  $3\frac{1}{2}$  mm. longa apice attenuata acuminata. Capsula recta oblonga erostrata 1 cm. longa 4 mm. lata.

HAB. In monte Morrison, ad 6500 ped. alt., leg. T. KAWAKAMI et U. MORI, Oct. 1906, (No. 2323).

Near *G. Henryi* ROLFE., but the leaves of the present plant are narrower, acuter, and the bracts are more acuminate.

**Goodyera pachyglossa** HAYATA sp. nov. Caulis 25 cm. longus basi 3–4 cm. in diametro deorsum glaber sursum breve hirsutus tota longitudine foliatus. Folia alterna 3 cm. a se remota oblique ovato-oblonga 5 cm. longa 2 cm. lata apice obtusa ad summum minute obscureque mucronata basi rotundata subito ad petiolum abeuntia margine subintegra vel obscure minuteque crispata, petiolis 2 cm. longis basi dilatatis vaginiformibus, partibus vaginiformibus 1 cm. longis. Racemi (vel partes floriferæ caulis) 5 cm. longi dense floriferi, rhachibus breve hirsutis, bracteis lanceolatis 12 mm. longis 3 mm. latis glabris, ovariis 9–10 mm. longis hirsutis 3–nerviis. Sepalum posticum valde concavum ovato-oblongum 8 mm. longum 3–4 mm. latum apice obtusum basi  $\pm$  contractum  $1\frac{1}{2}$  mm. latum 3–nervium extus  $\pm$  hirsutum intus glabrum, lateralia oblique ovata 8 mm. longa 4 mm. lata apice obtusa 3–nervia extus hirsuta intus glabra. Petala rhomboideo-obovato-cuneata  $8\frac{1}{2}$  mm. longa  $3\frac{1}{2}$  mm. lata apice triangulari-obtusa basi cuneato-attenuata 1–nervia margine sursum subundulato-crispata. Labellum ovatum 7 mm. longum basi ventricosum, ventriculo 3 mm. longo totiusque lato extus glabro intus dense hirsuto, pilis complanatis 1 mm. longis, valde crassum ad margine tenuissimum membranaceum. Columna 1 mm. longa. Rostellum 2–partitum, partibus linearibus 3 mm. longis. Anthera elongato-ovata 3 mm. lata.

HAB. Rinkiho, 5000 ped. alt., leg. H. INABA, 1911, Aug. (fl. rosacei).

Near *G. morrisonicola* HAY., but differs from it by the much thicker lips, larger leaves, and by the longer stems.

***Cryptostylis* R. BR.**

***Cryptostylis erythroglossa*** HAYATA sp. nov. (Tab. XVIII.) Radices incrassatæ. Folia 2 crassiuscula in exsiccatō membranacea elliptico-ovata vel elliptica 10 cm. longa 5 cm. lata apice obtusa basi obtuso-contracta subtus pallidiuscula, petiolis 3 cm. longis subplicatis. Scapi 7 cm. longi, floribus racemosim dispositis, bracteis lanceolatis 7–10 mm. longis acuminatis. Sepala æqualia linearia 13 mm. longa 2 mm. lata margine interiore plicata viridia

apice acuminata. Petala viridia linearia 9 mm. longa 1 mm. lata margine con-  
 duplicatim vel singulariter plicata apice acuminata patentia. Labellum superius  
 oblongo-ovatum vel lanceolato-ovatum 13 mm. longum 5 mm. latum rubrum apice  
 acuminatum basi rotundatum basi breve saccatum, (sacco ore triangulari  
 2 mm. longo  $1\frac{1}{2}$  mm. lato) multinerviū supra minute denseque puberulum.  
 Columna brevissima 1 mm. longa; appendiculæ clinandrii (staminodia) 2  
 pulviniformes.

HAB. Formosa: loco non indicato, cult. in seminario Taihoku, leg. B.  
 HAYATA, Jan., 1912.

Near *Cryp. filiformis* (BLUME Fl. Jav. Orchid. Vol. I. t. 45, fig. 3).

### *Nervilia* GAUD.

***Nervilia purpurea*** (HAYATA) (Tab. XIX.) Mater. Fl. Formos. p. 345.  
 Herba terrestris; caulis foliatus brevissimus bulbosus, scapis floriferis  
 aphyllis vaginatis. Folia cordata 5 cm. longa 6 cm. lata apice rotundata bre-  
 vissime apiculata basi cordata ad sinus acuta margine integra supra breve  
 setulosa subtus glabra, petiolis  $2\frac{1}{2}$  cm. longis. Scapi aphylli inferiore vaginati,  
 (vaginis 3 cm. longis apice rotundatis summum brevissime apiculatis), sursum  
 2-3 florati, bracteis oblanceolatis  $1\frac{1}{2}$  cm. longis 2 mm. latis. Sepala æqualia  
 libera erecta spathulata 15 mm. longa 3 mm. lata apice breve acuta basi  
 attenuata. Petala sepalis angustiora lineari-oblanceolata 14 mm. longa  $2\frac{1}{2}$  mm.  
 lata apice breve acuta basi attenuata erecta. Labellum basi columnæ situm  
 rectum liberum erectum obovatum obscure 3-lobatum 12 mm. longum 10 mm.  
 latum apice rotundatum. Columna elongata 7 mm. longa apice clavata erecta.

HAB. Kōshūn: leg. T. KAWAKAMI, Juli. 1906, (No. 5150).

Near *Pogonia plicata* LINDL., but differs from it by the broader oblanceolate  
 sepals and much narrower linear bracts.

***Nervilia yayamensis*** HAYATA (Fig. 62) Ic. Pl. Formos. II. p. 140.  
 Scapi aphylli 40-50 cm. longi inferiore ad nodos vaginati, internodiis 10 cm.  
 longis, vaginis 3 cm. longis ore obliquis, laminis obtusis, medio squamis singulis  
 instructi, squamis amplexicaulibus elongatis 3 cm. longis acutis, partibus  
 floriferis 10-15 cm. longis, bracteis lanceolatis, pedicellis (cum ovariis) 6-7 mm.  
 longis, floribus horizontaliter patentibus vel nutantibus. Flores semipatentes,  
 23 mm. longi. Sepala subæqualia linearia, posticum 17 mm. longum  $2\frac{1}{2}$  mm.



latum apice acutum basi leviter attenuatum non contractum 3-nervium, lateralia vix latiora quam iis posticis 17 mm. longa 3 mm. lata 3-nervia apice acuta basi attenuata non contracta. Petala linearia 16 mm. longa 2 mm. lata apice acuta basi attenuata non contracta. Label-  
lum ovatum 17 mm. longum 10 mm. latum apice 3-lobatum, lobis lateralibus acutis brevibus, lobo medio latiore ovato 6 mm. longo 5 mm. lato apice obtuso basi non contracto, basi trinervium, venulis lateralibus obliquis plurimis, supra barbato-

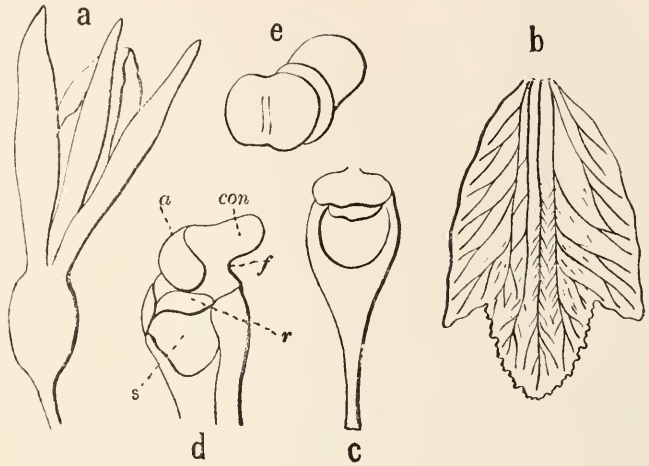


Fig. 62, *Nervilia yayuamensis* HAYATA; a, a flower; b, a lip; c, a column, seen from front; d, the same, seen from side; e, anther; r = rostellum, s = stigma, c = clinandrium, a = anther, con = connective, f = filament.

hirsutum. Columna semiteres 6 mm. longa apice plus minus clavata exalata. Pollinia 2 granulosa. Ovarium obovoideum  $3\frac{1}{2}$  mm. longum apice truncatum basi distincte constrictum prominente 2-costatum inter costas 1-costulatum.

HAB. Yayama; Ishigakishima, Juli., 1910.

Near *Pogonia Scottii* REICH. f. in Ann. Roy. Bot. Gard. Calc. VIII. t. 360; but differs by the barbate lips with obtusely contracted base.

### *Didymoplexis* GRIFF.

***Didymoplexis subcampanulata* HAYATA** (Fig. 63) Ic. Pl. Formos. II. p. 136. Herba tenuis aphylla, rhizomatibus tuberiferis, tuberibus fusiformibus  $1\frac{1}{2}$  cm. longis 6–7 mm. latis moniliforme 2–3 continuis. Scapi erecti 5–6 cm. longi teretes inferiore 1–2-nodosi, ad nodos squamis unis instructi, squamis fissis vel integris 4 mm. longis triangularibus, partibus floriferis  $2\frac{1}{2}$  cm. longis, superiore sub floribus singulis 1-bracteatis, bracteis late triangularibus apice obtusis basi latissimis  $2\frac{1}{2}$  mm. longis 3 mm. latis. Flores spicati inferiore

3 mm. a se remoti superiore plus dense dispositi subcampanulatum patentes 1 cm. longi 5 mm. lati, pedicellis cum ovariis 12 mm. longis. Sepala : posticum elongato-oblongum 1 cm. longum 4 mm. latum apice rotundatum, inferiore cum

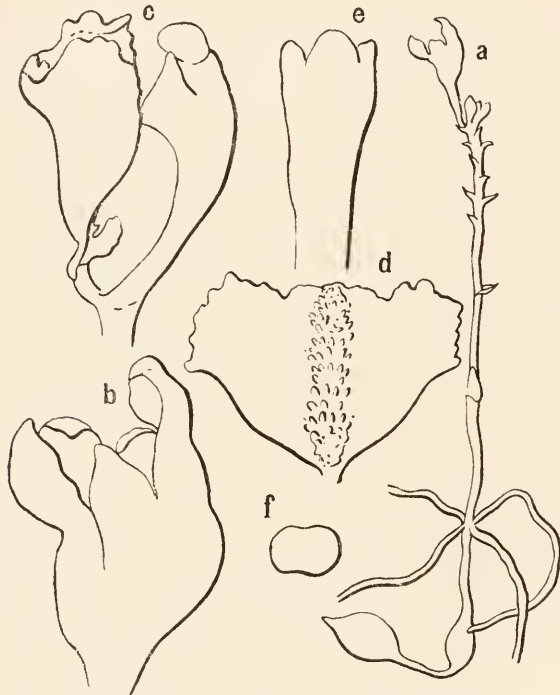


Fig. 63, *Didymoplexis subcampanulata* HAYATA; a, the plant; b, a flower, seen from side; c, the same, sepals and petals taken off; d, lamina of the lip; e, apical portion of a column; f, pollinia, very soft; fig. a, natural size.

petalis connatum, lateralia postico aequilonga se latere interiore a basi usque ad medio connata superiore libera apice rotundata. Petala cum sepalo postico subsimilia sed breviora. Labellum late cuneato-triangulari 5 mm. longum ad apicem truncatum 6 mm. latum apice erosum basi breve unguiculatum, unguibus  $\frac{1}{2}$  mm. longis, apice unguium 1-appendiculatum, appendiculis lamellatis erectis latissimis, medio 3-seriatim cristato-tuberculatum, tuberculis lamelli-formibus. Columna 5 mm. longa apice alata basi exalata. Capsula oblonga utrinque contracta 17 mm. longa 8 mm. lata 6-valvatis dehiscens, valvis ad

utrage extremitatem unitis 3 latioribus 3 angustioribus, extus parce minute tuberculata. Semina minutissima filiformi-linearia  $1\frac{1}{4}$  mm. longa.

HAB. Kōshūn, leg. T. KAWAKAMI, Mart., 1910, et B. HAYATA Aug., 1912.

Near *D. pallens* GRIFF., but differs from it by nearly campanulate flowers with obtriangular lips. *D. pallens* GRIFF. figured in Ann. Roy. Bot. Gard. Calc. V. t. 346 has rather tubular flowers with cuneate oblong lips. The description of capsules above given is drawn up from another specimen which was doubtingly referred to *D. pallens* by myself in my Materials for a Flora

of Formosa p. 347. The type specimen, with several duplicates, was first collected by Mr. T. KAWAKAMI at Kōshūn. The plant was also found by myself in my excursion to the island in the beginning of July, 1912, on the sandy ground in a clump of shrubs near the sea-shore on the eastern coast of the south cape.

*Galera* BLUME.

**Galera kusukusensis** HAYATA sp. nov. (Tab. XX.) Terrestis aphylla laticolor tuberifera. Tuber oblongo-ovoideum horizontaliter situm vel ascendens 1-2 cm. longum 8 mm. in diametro subnudum apice scapum singulum gerens. Scapi circ. 30 cm. longi basi squamis verticillatis instructi a basi sursum squamis remotis alternis instructi, squamis ovatis 1 cm. longis basi semi-amplexicaulibus apice acutis, partibus floriferis 10 cm. longis, floribus 1-2½ cm. a se remotis, bracteis linearibus vel lanceolatis circ. 1 cm. longis, pedicellis 5 mm. longis submutantibus, ovariis globosis 5 mm. in diametro. Sepala et petala semiclausa non patentia. Sepala subæqualia linearia 10 mm. longa 1 mm. lata apice acuminata basi non contracta. Petala lanceolata 10 mm. longa quam sepalis latiora 1½ mm. lata apice acuminata basi non contracta. Labellum valde concavum erectum oblongum 10 mm. longum in explicato 8 mm. latum apice triangulari-obtusum margine undulato-crispatum supra purpureo-maculatum, maculis 4, sursum muricato-tuberculatum basi ad calcar 3½ mm. longum productum. Columna brevissima. *Epipogon kusukusense* HAYATA in sched. herb. Taihoku.

HAB. Kusukusu, leg. B. HAYATA et S. SASAKI, 1912, Juli.

Near *Galera Rolfei* HAYATA (= *Epipogon Rolfei* HAY.); but differs from it by the longer lips which are undulately crispate at the margin, and by the much narrower petals.

**Galera Rolfei** HAYATA (Fig. 64) Mater. Fl. Formos. p. 348. Tuber solitarium 3 cm. longum 12 mm. latum elongato-ellipticum apice obtusum carnosum horizontaliter situm. Scapus circ. 35 cm. longus incrassatus erectus rectus basi ascendens teres brunneus inferne squamis distantibus amplexicaulibus obtusis tenuissimis membranaceis instructus, superne florifer, bracteis alternis erecto-patentibus lineari-lanceolatis acuminatis membranaceis circ. 1 cm. longis uni-florem amplexantibus. Flores in pedicellis filiformibus cernui aut tandem

penduli scapo concolores. Sepala æquiformia angustata erecta 7 mm. longa 1 mm. lata obtuso-acuminata integra parvissime punctata, lateralibus plus minus obliquis. Petala sepalo latiora 7 mm. longa 2 mm. lata acuminata. Labellum sessile concavum gynostemium amplexans, ima in calcar breve obtusum 3 mm.

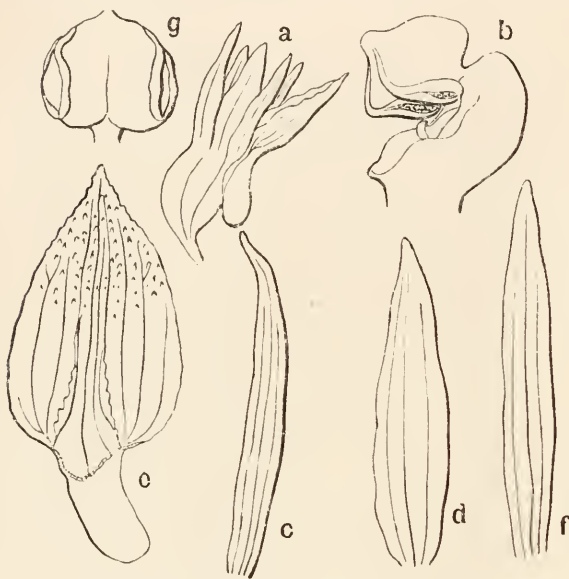


Fig. 64, *Galera Rolfei* HAYATA; a, a flower; b, a dorsal sepal; c, a lateral sepal; d, a petal; e, a lip; f, a column; g, an anther.

longum rectum productum, limbo ovato obtuso 9 mm. longo erecto ad marginem subintegro vel sub lente minutissime eroso intus papilloso infra apicem parvissime papilloso. Gynostemium brevissimum crassum obtusissimum 2 mm. longum dorso rotundato-convexum. Ovarium obovoideum sulcatum, pedicello 4 mm. longo.

*Epipogon Rolfei* HAYATA  
in sched. herb. Tōkyō.

HAB. Okinawa, leg. S. TANAKA, 1891, Mai. (No. 147).

The present plant is near *G. nutans*, but differs from it in having shorter spurs, and in the lips which are nearly obtuse at the apex, nearly entire on the margin, and very much less papillose on the upper surface.

### *Platanthera* RICH.

***Platanthera longibracteata* HAYATA sp. nov.** Caulis 30–40 cm. longus basi vaginatus, (vaginæ 4 cm. longis apice obtusis), infra medium 1–2–3-foliatus medio squamatus, partibus squamatis 10 cm. longis, sursum florifer, partibus floriferis 10 cm. longis. Folia spathulata vel ovato-oblongata apice obtusa 16 cm. longa 3 cm. lata apice obtusa deorsum gradatim angustata ad vaginam  $1\frac{1}{2}$  cm. longam abeuntia exsiccatō membranacea. Racemi laxè florati glabri, floribus a se 1 cm. remotis, bracteis lanceolatis  $1\frac{1}{2}$  cm. longis acuminatis, floribus sessilibus, ovariis vel fructibus 6–7 mm. longis ellipsoideis apice rostratis



3 mm. latis. Sepalum posticum triangulari-oblongum  $2\frac{1}{2}$  mm. longum  $1\frac{1}{2}$  mm. latum apice obtusum basi  $\pm$  dilatatum 3-nerviū, lateralia oblonga  $\smile$ -formiter recurva 4 mm. longa  $1\frac{1}{2}$  mm. lata apice obtusa basi angustata 1 mm. lata 3-nervia. Petala triangulari-oblonga 3 mm. longa 1 mm. lata 1-nervia apice acuta basi haud contracta. Labellum lineare 6 mm. longum  $\frac{1}{2}$  mm. latum apice obtusum facie longitudinaliter rugosum basi calcaratum, calcari lineari 1 cm. longo  $\frac{1}{2}$  mm. lato utraque extremitate angustato apice obtuso. Columna brevissima.

HAB. Mt. Morrison, ad 8500 ped. alt., leg. S. SASAKI.

**Platanthera pachyglossa** HAYATA sp. nov. (Tab. XXI.) Caulis 30 cm. longus erectus glaber angulosus basi vaginatus deorsum foliatus sursum racemosus. Folia ovato-oblonga vel oblongo-lanceolata 6 cm. longa  $1\frac{1}{2}$  cm. lata apice acuta ad summum obtusa basi obtusa ad basin plus minus decurrentia caulem semi-amplexantia. Racemi 10 cm. longi, floribus a se 1–2 cm. remotis, bracteis florem vix superantibus lanceolatis, pedicellis circ. 0 vel brevissimis, ovariis circ. 1 cm. longis linearibus. Sepalum posticum rotundatum vel ovato-rotundatum 5 mm. longum  $4\frac{1}{2}$  mm. latum apice obtusum basi leviter truncato-cordato-contractum ad insertionem 2 mm. latum, lateralia lineari-lanceolata 7 mm. longa  $2-2\frac{1}{2}$  mm. lata  $\smile$ -formiter recurva margine extime recurva apice acuto-obtusa basi non contracta. Petala valde oblique late rotundata longe cuspidata cum cuspidibus 5 mm. longa 4 mm. lata, cuspidibus linearibus 3 mm. longis apice obtusis 1 mm. latis. Labellum lineari-lanceolatum crassiusculum rectum 9 mm. longum 2 mm. latum. Columna lata brevis.

HAB. Formosa: loco non indicato.

**Platanthera stenoglossa** HAYATA sp. nov. Caulis 40 cm. longus infra medium 1-foliatus medio sursum squamatus, squamis ovato-lanceolatis lanceolatis vel lineari-lanceolatis 1–3 cm. longis. Pars caulis florifera 10 cm. longa glabra, bracteis acuminato-ovatis vel ovato-lanceolatis 15–13 mm. longis  $3\frac{1}{2}$  mm. latis 3-nerviis. Sepalum posticum oblongum  $4\frac{1}{2}$  mm. longum 2 mm. latum apice obtusum basi contractum 1-nerviū, lateralia linearia postico angustiora 6 mm. longa  $\smile$ -formiter recurva  $\frac{2}{3}$  mm. lata 1-nervia apice obtusa. Petala obliqua cuspidato-ovata  $4\frac{1}{2}$  mm. longa  $2\frac{1}{2}$  mm. lata apice obtusa basi valde oblique rotundata. Labellum lineare angustatum 5 mm. longum  $\frac{2}{3}$  mm.

latum apice obtusum crassiusculum basi calcaratum, calcar lineari 6 mm. longo  $1\frac{2}{3}$  mm. lato antice leviter recurvo. Columna (cum anthera) 3 mm. longa totiusque lata.

HAB. Shichiseitonzan, leg. T. KAWAKAMI et Y. SHIMADA Juli, 1910.

Remarkable for having narrower lateral sepals than the dorsal one.

**Platanthera truncatolabellata** HAYATA sp. nov. (Fig. 65). Caulis erectus gracilis minute brevissime hirtellatus 35 cm. longus ad totam longitudinem foliatus superne florifer. Folia alterna sessilia oblonga 3 cm. longa 12 mm. lata apice rotundato-acuta basi in vaginam brevem contracta amplexicaulia, vaginis 3 mm. longis. Flores ad axillas foliorum superiorum solitarii vel racemosi, racemis 10 cm. longis. Flores mediocres  $1\frac{1}{2}$  cm. in diametro. Sepala inæqualia erecto-patentia, posticum oblongo-angustatum  $8\frac{1}{2}$  mm. longum  $2\frac{2}{3}$  mm. latum apice rotundato-acutum, lateralia latiora ovata 8 mm. longa 3 mm. lata apice attenuato-obtusa basi rotundata valde obliqua latere labelli connata. Petala ovato-oblonga 7 mm. longa 2 mm. lata basi obliqua ad basin columnæ connata apice attenuato-obliqua. Labellum 13 mm. longum unguiculatum, unguis basi columnæ connatus in calcar productus, calcar latissimo 5 mm. longo, ore 4 mm. in diametro, lamina obovato-rotundata 1 cm. longa 8 mm. lata apice emarginata margine crispa prope medium parce 3-lamellata, lamellis brevissime hirtellatis. Columna 2 mm. longa.

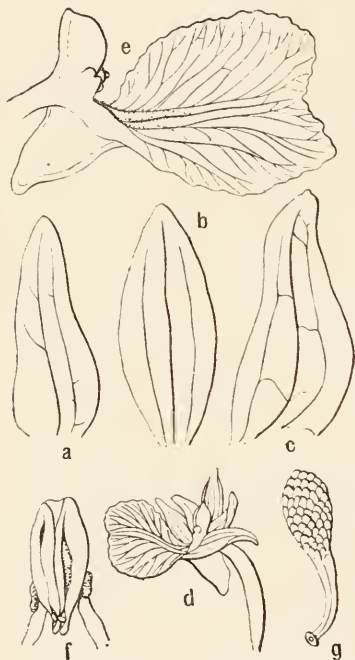


Fig. 65, *Platanthera truncatolabellata* HAYATA; d, a flower; b, a dorsal sepal; c, a lateral sepal; a, a petal; e, a lip; f, column; g, a pollinarium.

*Platanthera obcordata* HAYATA (non LINDL.) in Materials for a Flora of Formosa p. 351.

HAB. Nantō: Randaizan, leg. T. KAWAKAMI et U. MORI, Juli, 1907, (No. 3482).

Near *P. obcordata* (Orch. Western Himalayas in Ann. Roy. Bot. Gard. Calc. IX. p. 144); but differs from it by the quite truncate or emarginate lips.

**Platanthera** sp. (Fig. 66.) Terrestriis; Tuber suberectum cylindricum 1 cm. longum. Caulis 20 cm. longus gracilis erectus deorsum supra basin 2-3-foliatus sursum racemosus, partibus inter floriferas et foliatis 8 cm. longis remote squamatis, squamis 5 mm. longis linearibus. Folia oblonga vel ovato-oblonga  $3\frac{1}{2}$  cm. longa 1 cm. lata apice obtusa vel acuta ad summum breve aristata vel obtusa basi caulem amplectantia ad vaginam 5 mm. longam abeuntia. Racemi (partes floriferae) 8 cm. longa glabra, floribus a se 5-10 mm. remotis, bracteis ovato-lanceolatis 5 mm. longis  $1\frac{1}{2}$  mm. latis glabris. Sepalum posticum ovato-oblongum 3 mm. longum  $1\frac{1}{2}$  mm. latum apice truncato-obtusum basi leviter contractum  $\frac{2}{3}$  mm. latum 1-nerviium margine interiore leviter recurvum, lateralia postico angustiora 3 mm. longa 1 mm. lata oblique lineari-oblonga apice obtusa basi obliqua non contracta 1-nervia margine interiore recurva. Petala sepalo postico conformia sed minora. Labellum profunde cruciforme 3-lobum, lobis basilaribus lineari-filiformibus a lobo terminali angulo  $90^\circ$  divaricatis 4 mm. longis  $\frac{1}{10}$  mm. latis recurvis, lobo terminali lineari 2 mm. longo  $\frac{1}{2}$ - $\frac{1}{3}$  mm. lato apice obtuso recto, basi calcaratum, calcaris spathulato-lineari 4 mm. longo sursum dilatato  $\frac{2}{3}$  mm. lato apice obtuso basi angustato subrecto. Columna brevissima; anthera  $\frac{2}{3}$  mm. lata.

HAB. Kappanzan, leg. W. R. PRICE, Juli. 1912.

This interesting tiny orchid was collected by Mr. W. R. PRICE in July, 1912, in an open country among dense *Miscanthus* in Mt. Kappanzan. It is somewhat near *Habenaria aristata* Hook. f. (in Orchids of the Sikkim Himalayas

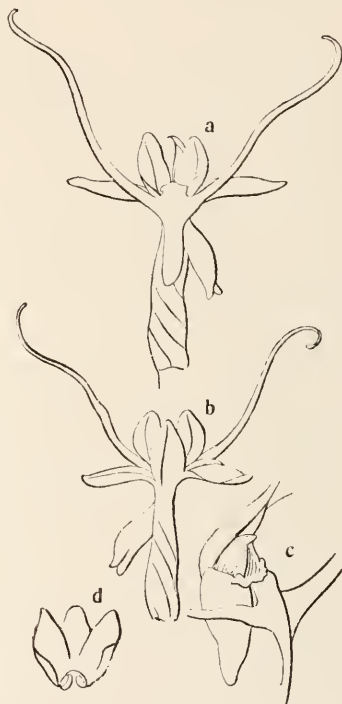


Fig. 66, *Platanthera* sp.; a, a flower; b, the same, seen from back; c, central part of the same; d, a column, with a dorsal sepal and petals.

in Ann. Roy. Bot. Gard. VIII. t. 409), but differs from it in having much smaller form and very much more divaricate filiform basal lobes of the lips. I should propose to call this orchid *Platanthera Pricei*, if it proves to be new species of the named genus, or I should rather entirely leave it to Mr. PRICE to name this orchid, as this is one of Mr. PRICE's collections. It lacks in the collections of my own.

***Habenaria* WILLD.**

***Habenaria goodyeroides* DON var. *formosana* HAYATA n. v.** (Tab. XXII.) Caulis elongatus 60 cm. longus glaber, partibus inferioribus aphyllis, intermediis foliis congestis, superioribus aphyllis floriferis, partibus aphyllis infra folia congesta 25 cm. longis vaginatis, vaginis 5 cm. longis remote sitis ore leviter dilatatis apice truncatis, partibus foliatis 7 mm. longis 5-6-foliatis. Folia oblonga 13 cm. longa 5 cm. lata apice obtusa acuta basi contracta in vaginam amplexicaulem attenuata, vaginis  $2\frac{1}{2}$  cm. longis, squamis superne minoribus ovato-lanceolatis 2 cm. longis. Spicæ elongatæ 15 cm. longæ dense floratæ, bracteis ovato-lanceolatis 13 mm. longis apice aristato-acuminatis, floribus minoribus. Sepala inæqualia subpatentia, posticum ovatum  $4\frac{1}{2}$  mm. longum 3 mm. latum apice obtusum, lateralia angustiora basi obliqua cum petalis adnata apice dorso breve apiculata. Petala sepalo latiora late oblonga  $4\frac{1}{2}$  mm. longa  $2\frac{1}{2}$  mm. lata apice obtusa basi valde oblique labello connata. Labellum liguliforme 5 mm. longum 4 mm. latum apice dilatatum 3-lobatum, (lobo medio latissimo triangulari 3 mm. longo totiusque lato apice obtuso, lobis lateralibus angustioribus), basi calcaratum, calcar 2 mm. longo ore contracto  $1\frac{1}{2}$  mm. lato; discus basi 2-lamellatus, a medio sursum 1-lamellatus; staminodia 2 mm. longa angustata.

*Platanthera goodyeroides* var. *formosana* HAYATA = *Habenaria goodyeroides* HAYATA (non DON.) Mater. Fl. Formos. p. 353.

Differs from the type by the narrower leaves and lamellate discs.

***Habenaria linearipetala* HAYATA sp. nov.** (Tab. XXIII.) Caulis circ. 50 cm. longus deorsum vaginatus, medio approximativ foliatus sursum racemosus. Folia medio caulis approximativ sita obovato-oblanccolata 18 cm. longa 4 cm. lata apice acuminata basi attenuata basi vaginata, vaginis 2 cm. longis caulem amplexantibus, in exsicco membranacea. Racemi 10 cm. longi



dense floriferi, bracteis lanceolatis  $1\frac{1}{2}$  cm. longis apice acuminatis basi attenuatis, pedicellis fere 0, ovariis linearibus vel ovatis circ. 1 cm. longis. Sepalum posticum ovato-lanceolatum circ. 1 cm. longum apice filiforme acuminatum medio  $2\frac{1}{2}$  mm. latum basi leviter contractum concavum 3-nervium, lateralia postico conformia vix latiora 3 mm. lata plus minus obliqua. Petala linearia 9 mm. longa  $\frac{1}{3}$  mm. lata apice acuminata basi dilatata. Labellum 3-partitum, parte centrali lineari longissima circ. 10 mm. longa  $\frac{1}{2}$  mm. lata, partibus lateralibus linearibus centrali brevioribus 5 mm. longis angustissimis  $\frac{1}{3}$  mm. latis apice acuminatis, basi calcaratum, calcar 13 mm. longo 1 mm. lato lineari antice leviter recurvo. Anthera  $1\frac{1}{2}$  mm. longa erecta 2-brachiata, brachiis divaricatis, staminodiis claviformibus  $\frac{1}{2}$  mm. longis. Rostellum  $\lambda$ -forme 2-brachiatum, brachiis divaricatis  $1\frac{1}{2}$  mm. longis apice se approximatis descendentibus; stigma 2-partitum, partibus distincte separatis linearibus complanato-teretibus  $1\frac{1}{2}$  mm. longis.

HAB. Mt. Morrison, ad 8500 ped. alt. leg. S. SASAKI, 1909, Oct.

Near *Habenari astenopetala* LINDL. (Orchids of the Sikkim Himalayas in Ann. Roy. Bot. Gard. Calc. VIII. t. 404), in having linear petals and linear 3-lobed lips; but differs from it by the long tailed sepals and much narrowly based leaves.

**Habenaria longitentaculata** HAYATA sp. nov. (Tab. XXIV.) Caulis erectus 55 cm. longus basi 8 mm. in diametro glaber inferiore vaginatus, vaginis cylindricis 3 cm. longis 8 mm. latis ore obliquis a se  $4\frac{1}{2}$  cm. remotis, medio foliatus, foliis approximatis, sursum squamatus, squamis ovatis a se  $3\frac{1}{2}$  cm. remotis 2 cm. longis caulem amplexantibus, sursum florifer, partibus floriferis 10 cm. longis. Folia ad medium caulis approximata alterna oblongo-obovata vel ovata 12 cm. longa 5 cm. lata apice breve cuspidato-acuta basi cuneato-attenuata ad vaginam abeuntia, venis primariis parallelis, secundariis transversis manifeste reticulatis. Racemi 10 cm. longi remote florati, floribus a se 2-3 cm. remotis, bracteis ovatis acuminatis 18 mm. longis 6-7 mm. latis. Perianthia patentia, sepalum posticum galeæforme valde concavum 1 cm. longum 6 mm. latum apice acutum basi contractum 3-nervium; sepala lateralia postico conformia sed valde obliqua. Petala profunde 2-loba vel 2-partita, partibus angulo  $180^\circ$  se divaricatis linearibus 1 cm. longis basi

1 mm. latis sursum teretibus. Labellum tripartitum, partibus linearibus, parte centrali 11 mm. longa  $\frac{1}{2}$  mm. lata, lateralibus centrali brevioribus 6 mm. longis a centrali angulo  $45^\circ$  divaricatis, basi calcaratum, calcar 12 mm. longo antice recurvo ore 3 mm. in diametro. Rostellum  $\lambda$ -forme 2-brachiatum, brachiis 2 mm. longis. Anthera  $\Delta$ -formia 2-brachiata, brachiis divaricatis rostello parallelis; staminodia claviformia; stigmata 2-partita, partibus lineari-fusiformibus  $4\frac{1}{2}$  mm. longis  $\frac{1}{2}$  mm. latis paralleliter se remotis.

HAB. Nantōchō, in montibus, leg. U. MORI, 1909.

Near *H. ciliolaris* KRÄNZL, but differs from it by the quite glabrous scapes and biparted petalae, portions of which are divaricated at  $180^\circ$ . Also near *Habenaria stenopetala* LINDL. var. *polytricha* Hook. f. (Orchids of the Sikkim Himalayas in Ann. Roy. Bot. Gard. VIII. t. 404, bis) in having long linear petals attaching at their centres to the apex of the ovary, and long linear 3-lobed lips; but differs altogether from it in the leaves, bracts and not tailed sepals.

**Habenaria tohoensis** HAYATA sp. nov. (Fig. 67). Caulis 40–50 cm.

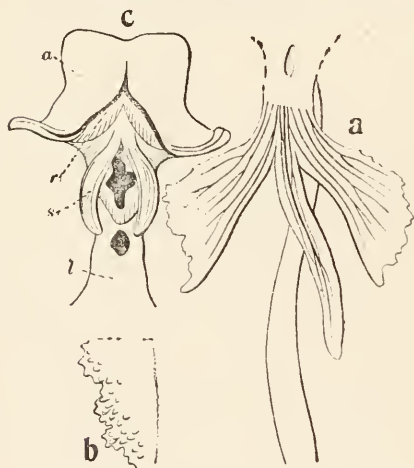


Fig. 67, *Habenaria tohoensis* HAYATA; a, a lip; b, marginal portion of the same; c, central portion of a flower; a=anther, r=rostellum, s=stigma, l=lip.

longus basi vaginatus supra basin foliatus a medio sursum squamatus, vaginis cylindraceis 6 cm. longis, squamis ovato-lanceolatis 2–3 cm. longis apice acuminatis vel lineari-acuminatis, versus apicem flores 2–3-gerens toto glaber. Folia obovato-oblonga vel elliptico-oblonga 11 cm. longa 3 cm. lata apice acuta basi cuneato-angustata ad summum tenuiter aristata. Flores apertientes  $2\frac{1}{2}$  cm. in diametro, bracteis lineari-lanceolatis 2 cm. longis 4 mm. latis 3-nerviis apice lineari-acuminatis, subsessiles, ovariis 2 cm. longis 3 mm. latis ovato-fusiformi-linearibus apice longe rostratis basi contractis glabris. Sepalum posticum oblongo-ovatum 1 cm. longum 4–5 mm. latum 5-nerviium apice obtusum basi  $\pm$  contractum, lateralia

longus basi vaginatus supra basin foliatus a medio sursum squamatus, vaginis cylindraceis 6 cm. longis, squamis ovato-lanceolatis 2–3 cm. longis apice acuminatis vel lineari-acuminatis, versus apicem flores 2–3-gerens toto glaber. Folia obovato-oblonga vel elliptico-oblonga 11 cm. longa 3 cm. lata apice acuta basi cuneato-angustata ad summum tenuiter aristata. Flores apertientes  $2\frac{1}{2}$  cm. in diametro, bracteis lineari-lanceolatis 2 cm. longis 4 mm. latis 3-nerviis apice lineari-acuminatis,

oblique ovata 11 mm. longa  $5\frac{1}{2}$ –6 mm. lata apice acuminata  $\sim$ -formiter sensim recurva basi valde contracta basi rotundata 7-nervia margine integra. Petala lanceolata 11 mm. longa 2 mm. lata apice acuminata 1-nervia. Labellum  $\wedge$ -forme 16 mm. longum totiusque latum basi subito cuneato-contractum basi  $1\frac{1}{2}$  mm. latum alte 3-lobum, lobis lateralibus (basilaribus) semi-rotundatis unilateralibus 1 cm. longis  $\frac{1}{2}$  cm. latis apice acutis vel acuminatis margine interiore rectis margine exteriori  $\cap$ -formibus basi cuneatis margine exteriori sursum irregulariter denticulatis multinerviis, lobo terminali (centrali) lineari-lanceolato 12 mm. longo 2 mm. lato apice obtuso basi laud contracto medio congesto-multinervio, sinibus inter lobos laterales et lobum terminalem acutis, calcar longissimo 4 cm. longo  $1\frac{1}{2}$  mm. lato apice obtuso subrecto. Columna brevissima.

HAB. Tôhozan, ad 6500 ped. alt., leg. S. SASAKI, Oct. 1909.

Near *H. Miersiana* CHAMP., but differs from it by the not fimbriate lobes of the lip. Also near *H. geniculata* DON (Orchids of the Sikkim Himalayas, in Ann. Roy. Bot. Gard. Calc. VIII. t. 405), but differs by the much longer central lobes of the lips.

*Hemipilia* LINDL.

**Hemipilia formosana** HAYATA (Tab. XXV.) Mater. Fl. Formos. p. 354.

Selaginellaceæ.

*Selaginella* SPRING.

**Selaginella stenostachya** HAYATA sp. nov. (Fig. 68) Caulis cum spicis 8 cm. longus glaber pluri-sulcatus paucè remoteque foliosus. Folia a se  $1\frac{1}{2}$  mm. remota, dorsalibus minoribus ovatis  $1\frac{1}{4}$  mm. longis  $\frac{1}{2}$  mm. latis apice cuspidato-acutis basi leviter contractis margine minute aristato-serrulatis, ventralibus majoribus  $1\frac{1}{2}$  mm. longis  $\frac{2}{3}$  mm. latis ovatis apice obtusissimis basi truncato-rotundatis margine minute aristato-serrulatis. Spicæ versus apicem ramorum racemosim dispositæ simplices erectæ rectæ tenuiter tetragonocylindræ 7–8 mm. longæ cum bracteis 2 mm. latæ, bracteis radiatis 4-seriatim dispositis imbricatis interdum subpatentibus, dorsalibus ventrali æqualibus rotundato-ovatis 1 mm. longis  $\frac{2}{3}$  mm. latis apice cuspidato-acutis basi

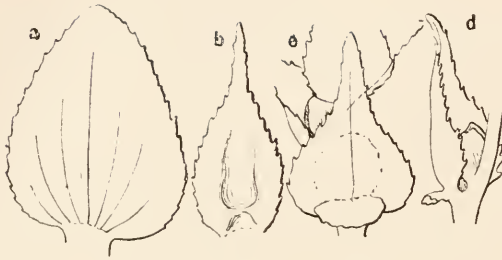


Fig. 68, *Selaginella stenostachya* HAYATA; a, a ventral leaf; b, a dorsal leaf; c, a portion of a spike; d, a bract seen from side.

rotundatis ad extremitatem auriculis  $\frac{1}{3}$  mm. longis singulis instructis, margine minute setuloso-serrulatis tenuibus. *Selaginella leptophylla* HAYATA in MATSUM. et HAYATA Enum. Pl. Formos. p. 553 (non BAKER).

HAB. Shinkōchō, leg. T. KAWAKAMI.

Very near *S. leptophylla* BAKER, but differs from it by the much narrower spikes.

## Lycopodiaceæ.

### *Lycopodium* LINN.

***Lycopodium* (*Lepilotis*) *alpinum* LINN. var. *transmorrisonense* HAYATA n. v.** (Fig. 69) Caulis repens teres  $1\frac{1}{2}$  mm. in diametro sectionis ramosissimus, ramis ascendentibus dense foliosis apice interdum ad stipitem spicarum abeuntibus. Folia imbricatim spiraliter disposita adpressa vel  $\pm$  patentia ascendenti-recurva triangulari-lanceolata 3 mm. longa apice acuminata basi latissima minus 1 mm. lata crassa margine integra 1-nervia  $\pm$  complanata intus plana dorso rotundata in sectione plano-convexa margine obtusa. Spicæ cylindricæ  $2\frac{1}{2}$  cm. longæ 3-4 mm. in diametro sectionis, bracteis firme imbricatis densiuscule spiraliter sitis sub sporangio singulis caudato-ovatis apice caudato-acutis basi 1-auriculatis eum auriculis 4 mm. longis  $2\frac{1}{3}$  mm. latis margine irregulariter denticulatis, auriculis oblongo-triangularibus 1 mm. longis minus 1 mm. latis apice obtusis, utraque pagine glabris 1-nerviis, nervis dorso laud intus distincte

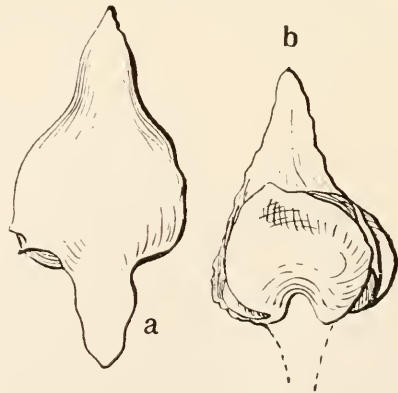


Fig. 69, *Lycopodium alpinum* var. *transmorrisonense* HAYATA, a, a bract seen from back; b, the same seen from face.



visis. Sporangium reniforme latius quam longius apice late rotundatum basi late sinuatum minus 2 mm. latum. Spicæ simplices ad apicem ramorum solitariae erectæ longe stipitatæ, stipitibus 3 cm. longis simplicibus erectis rectis subremote foliosis, foliis spiraliter laxiuscule dispositis firme adpressis lineari-lanceolatis 3–4 mm. longis  $1\frac{1}{2}$  mm. latis intus concavis extus convexis 1-nerviis utraque glabris margine integris vel irregulariter obscure denticulatis crassiusculis.

HAB. in montibus centralibus, leg. U. MORI, 1908, Dec.

Differs from the type (Hook. Brit. Fer. t. 53) and its variety *nikoense* by the long and distinctly peduncled solitary spikes.

**Lycopodium carinatum** DESV.; MATSUM. et HAYATA Enum Pl. Formos. p. 554.

HAB. Kōshūm: Kuram, leg. S. SASAKI, 1911, Dec.

**Lycopodium cunninghamioides** HAYATA sp. nov. Caulis pendulus dense spiraliter subdistiche foliosus cum foliis 3 cm. latus cum spicis 50 cm. longus. Folia acuminato-linearia vel acuminato-lanceolata 16 mm. longa apice aceroso-acuminata  $2\frac{1}{2}$  mm. lata basi leviter angustiora ad insertionem  $1\frac{1}{2}$  mm. lata margine integerrima leviter carinata 1-nervia, nervis supra planis versus apicem carinato-elevatis subtus planis, supra viridia subtus pallidiora, foliis dorsalibus basi plus minus tortuosis, ventralibus basi non tortuosis. Caulis versus apicem gradatim ad spicam abeuns, foliis caulinis superioribus gradatim minoribus ad bracteos spicarum abentibus. Spicæ 7–8 cm. longæ 17 mm. latæ, bracteis lineari-lanceolatis 11 mm. longis basi latissimis 2 mm. latis apice acuminatis basi rotundatis 1-nerviis margine integris supra basin ad 3 mm. tortuosis, nervis utraque pagine planis non-carinatis. Sporangia cordato-reniformia  $1\frac{3}{4}$  mm. lata  $1\frac{1}{2}$  mm. longa apice rotundata basi cordata, sinu cordis acuto.

HAB. Urai, leg. T. SŌMA, Junii. 1910, (No. 1).

Near *L. squarrosum* FORST.

**Lycopodium formosanum** W. HERTER, HAYATA Mater. Fl. Formos. p. 412.

HAB. Taitō: Manchōsha, leg. G. NAKAHARA, Jan., 1906, (No. 6).

I remember that I saw the type of the species at Kew herbarium. From my memory, I think the present plant here enumerated is identical with the type.

**Lycopodium juniperistachyum** HAYATA sp. nov. *Lycopodium pinifolium* HAYATA Mater. Fl. Formos. p. 412 (non BLUME) pro parte. Radices basi caulis ramosæ. Caulis pendulus cum spicis 25 cm. longus tota longitudine multisulcatus vel striatus densiuscule foliosus cum foliis 13–15 mm. latis. Folia spiraliter subdistiche subdorsiventraliter disposita lanceolata 11 mm. longa 2 mm. lata apice acuminata basi plus minus angustiora ad basin 1¼ mm. lata margine integra, (dorsalibus basi tortuosis, ventralibus non tortuosis), utraque glabra crasso-membranacea 1-nervia, nervis supra planis subtus distincte elevatis visis, subtus pagine plus minus pallidiora supra viridia nitida. Spicæ 8–13 cm. longæ terminales simplices vel 1–2-plo dichotome ramosæ cum bracteis 7–8 mm. latæ, bracteis spiraliter radialiter densiuscule dispositis cuspidato-lanceolatis 8 mm. longis apice lineari-acuminatis basi latissimis 1½ mm. latis rotundatis ad insertionem plus minus constrictis ⅔ mm. latis 1-nerviis, nervis intus planis extus (dorso) carinato-elevatis, margine integris basi non tortuosis. Sporangium ad axillas bractearum solitarium cordato-reniforme 1½ mm. latum 1¼ mm. longum latius quam longius apice rotundatum basi profunde cordatum, sinu cordis acuto.

HAB. Taitō: Manchōsha, leg. G. NAKAHARA, Jan., 1906, (No. 787).

*Lycopodium taxifolium* HAYATA Mater. Fl. Formos. p. 412 pro parte, (non Sw.)

Near *Lycopodium taxifolium* Sw; but differs from it by the linear narrower bracts. This specimen is exactly the same as a specimen from the Philippines which is labelled as *Lycopodium pinifolium* BLUME. Somewhat near *L. nitens* SCH. (KUNZE Farukräut. I. t. 80), but differs from it by the broader leaves.

**Lycopodium pulcherrimum** WALL. (HOOK. et GREV. Ic. Fil. t. 38).

HAB. monte Morrison, ad 8000 ped. alt., leg. T. KAWAKAMI et U. MORI, Oct., 1907, (No. 1783); Arisan, ad 8000–7000 ped. alt., leg. B. HAYATA et S. SASAKI, Jan., 1912.

Near *L. cryptomerinum* MAX., but differs from it by the thinner leaves of much softer texture.

**Lycopodium Selago** LINN.

HAB. in montibus centralibus, ad 11000 ped. alt., leg., U. MORI, 1908, Dec.

Compared with a Japanese specimen so labelled in the herbarium at Tōkyō.

**Lycopodium serratum** TH. var. **myriophyllifolium** HAYATA n. v. Terrestris; caulis suberectus basi plus minus ascendens tota longitudine densiuscule foliosus teres  $1\frac{1}{2}$  mm. in diametro. Folia linearia 12 mm. longa  $1\frac{1}{2}$  mm. lata apice acuminata, basi haud angustiora margine crispata undulata irregulariter serrulata, serrulis longioribus 1 mm. longis acutis ascendentibus, utraque pagine glabra 1-nervia, nervis supra (intus) elevatis subtus (extus) planis non distinctis. Sporangium ad axillas foliorum solitarium lunulato-reniforme  $1\frac{1}{4}$  mm. longum 1 mm. latum 2-valvatum brevissime stipitatum vel subsessile.

HAB. in monte Arisan, leg. U. MORI, 1908, Mart. (No. 6208).

Differs from the type by the much narrower linear leaves with sharp toothed and crispate margin.

**Lycopodium squarrosum** FORST in MATSUM. et HAYATA Enum. Pl. Formos. p. 555.

HAB. Taitō: Botansha, leg. G. NAKAHARA, Jan. 1906, (No. 789); Biōritsu, leg. S. NAGASAWA, Dec., 1906.

**Lycopodium subdistichum** MAKINO; HAYATA Mater. Fl. Formos. p. 412.

*Lycopodium pinifolium* HAYATA Mater. Fl. Formos. p. 412 pro parte, (non BLUME).

*Lycopodium taxifolium* HAYATA Mater. Fl. Formos. p. 412. pro parte, (non Sw).

HAB. Kōshūn: Botanrosha, Jan., 1906 (No. 791); Wantan, leg. T. KAWAKAMI, 1904; Arisan, leg. B. HAYATA, Jan., 1912.

**Lycopodium tereticaule** HAYATA (Fig. 70), Mater. Fl. Formos. p. 411. Descriptio auctata: Epiphyta densissime cæspitosa. Caulis teres filiformis pendulus sursum sorifer, partibus soriferis non distinctis filiformibus in longitudine variabilibus cum bracteis  $1\frac{1}{2}$  mm. in diametro sectionis, bracteis spiraliter plus minus imbricatim sitis late cuspidato-rotundatis  $1\frac{1}{4}$  mm. longis 1 mm. latis apice cuspidato-acutis basi leviter contractis crassiusculis intus planis dorso carinatis, (carinis deorsum decurrentibus), margine subintegris. Sporangium

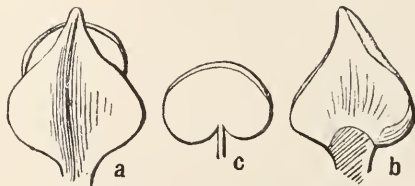


Fig. 70, *Lycopodium tereticaule* HAYATA; a, a bract, seen from back; b, the same, seen from face, sporangium taken off; c, a sporangium.

ad axillas bracteæ solitarium late cordatum reniforme 1 mm. latum  $\frac{1}{2}$  mm. longum apice rotundatum basi cordatum gracillime stipitatum, stipute tenuissimo  $\frac{1}{2}$  mm. vel  $\frac{1}{3}$  mm. longo.

HAB. Arisan, ad 8000 ped. alt., leg. B. HAYATA et SASAKI, 1912, Jan.

## Ophioglossaceæ.

### *Botrychium* Sw.

***Botrychium leptostachyum*** HAYATA sp. nov. (Fig. 71). Rhizoma? Stipes 14 cm. longus teres basi dilatatus toto glaber. Frons late triangularis



Fig. 71, *Botrychium leptostachyum* HAYATA; a, the plant; b, a portion of the spike; a =  $\times \frac{8}{33}$ , b, magnified.

16 cm. longa 26 cm. lata digitato-tripartita, parte terminali paniculam sporangiorum gerenti, eas laterales in longitudine æquanti; partibus lateralibus ovatis plus minus obliquis cum petiolis 16 cm. longis 9 cm. latis bipinnatifidis, (petiolis 2 cm. longis), apice acuminatis basi in ambitu cordatis, pinnis infimis (latere inferiore) longissimis 5–6 cm. longis oblique triangularibus basi 5–6 cm. latis, pinnulis infimis (latere inferiore) longissimis  $3\frac{1}{2}$  cm. longis oblongis

basi 2 cm. longis pinnatifidis, segmentis ovatis apice in ambitu obtusis basi late cuneatis inciso-lobatis, lobis acutis. Textura tenuissima herbacea, venulis terminalibus simplicibus vel furcatis distincte visis tenuissimis, rhachibus frondium subcomplanatis superiore subalatis, rhachibus pinnarum et pinnularum alatis cum alis 2 mm. latis. Pars frondis terminalis iis lateralibus æquilonga longe petiolata, (petiolo  $4\frac{1}{2}$  cm. longo medio paniculam sporangiorum gerenti), æqualiter latissime rhomboidea cum petiolo 16 cm. longa totiusque lata bipinnatifida, pinnis infimis triangulari-lanceolatis apice acuminatissimis 10 cm. longis 4 cm. latis, pinnulis infimis sessilibus oblongis 3 cm. longis  $1\frac{1}{2}$  cm. latis. Panicula sporangiorum tenuissima e medio petioli partis terminalis



frondis oriunda cum pedunculo 7 cm. longa  $1\frac{1}{2}$  cm. lata, (pedunculis  $2\frac{1}{2}$  cm. longis) recta, ramis panicularum 8 mm. longis oppositis angulo recto divaricatis sporangia spicatum gerentibus. Sporangia sessilia subglobosa basi latissima 2-valvata toto glabra.

HAB. Nōkōsan. leg. U. MORI, Jan., 1903, (No. 6291).

Near *B. virginianum* Sw. (EAT. Fern. North America t. 33), but differs from it by the more loosely arranged lobes of the pinnules, lobes of which are much more larger than those of *B. virginianum*, and by the much shorter panicles which are on the petioles of the terminal partitions of the fronds.

## Osmundaceæ.

### *Osmunda* LINN.

#### *Osmunda regalis* LINN. var.?

HAB. Tonkurankei, leg. U. MORI, 1910, Aprili.

No fertile frond. Sterile one is a little different from the type. It may be a variety of the same.

## Hymenophyllaceæ.

### *Trichomanes* SM.

***Trichomanes acuto-obtusum* HAYATA sp. nov.**  
(Fig. 72). Rhizoma repens filiforme. Stipes subnullus vel brevissimus vel usque 5 mm. longus. Frons cordato-ovata oblonga vel lanceolata variabilissima usque 2 cm. longa usque  $1\frac{1}{2}$  cm. lata apice rotundata vel obtusa pinnatifida vel bipinnatifida, pinnis vel pinnulis lobatis, lobis ultimis oblongo-linearibus 2-3 mm. longis  $1\frac{1}{3}$  mm. latis apice obtuso-acutis ad summum acutis, rhachibus frondium  $1\frac{1}{2}$  mm. latis; frons sursum sorifera; margine plus minus vel haud undulata plus minus desuper recurva, costis utraque pagine

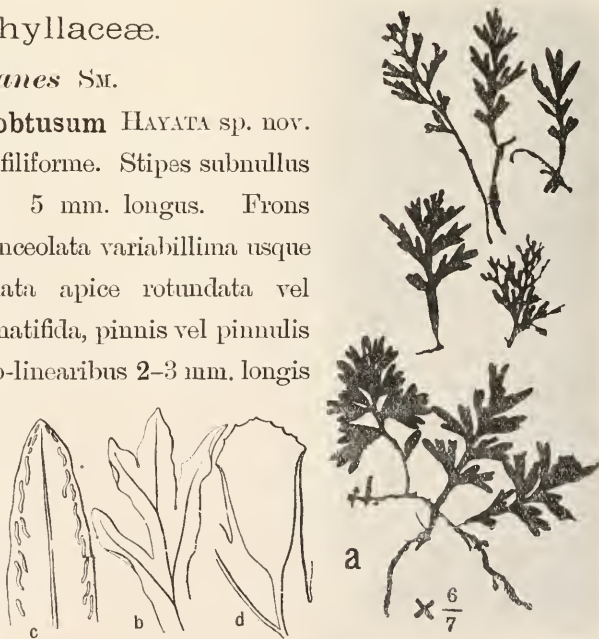


Fig. 72, *Trichomanes acuto-obtusum* HAYATA; a, the plant; b, a portion of a pinna; c, a portion of the same, showing the vermiform strings; d, a sorus.

elevatis; pagine supra pilis unicellularibus glandulosis brevissimis pauce dispersa subtus subglabrata. Involucrum ad basin pinnarum situm vel ad lobos inferiores pinnarum situm subascendens infundibulo-campanulatum  $1\frac{1}{2}$  mm. longum ad orem plus 1 mm. longum apice late rotundatum 2-valvatum, valvis brevibus plus 1 mm. latis minus  $\frac{1}{2}$  mm. longis margine erosodenticulatis.

HAB. Bonin, leg. Sōma.

Near *T. nanum*, but differs from it by the longer lobes and obtuse receptacles; from *T. filiculum*, differs by the more acute lobes. Also near *T. Kurzii* (BEDD. Fern. Brit. Ind. t. 286), but separable from it by the short obtuse valves of the involucres.

**Trichomanes cupressifolium** HAYATA sp. nov. (Fig. 73). Rhizoma



repens filiforme ferrugineo-pilosum remote foliosum. Stipes cum fronde perpendiculariter pendulus filiformis 15–17 mm. longus subglaber fusco-nigricans. Frons usque 9 cm. longa usque 3 cm. lata ovato-lanceolata vel lanceolata oblongo-lanceo-



lata apice attenuata vel angustata ad summum obtusa basi acuta vel acuto-truncata versus basin pinnata medio pinnatifida, pinnis alternis inferioribus longioribus, infimis brevioribus, superioribus gradatim breviori-

Fig. 73, *Trichomanes cupressifolium* HAYATA; a, the plant; b, a portion of the frond.

bus versus summum ad lobum simplicem reductis, pinnis inferioribus longissimis, 15 mm. longis 6 mm. latis ovato-lanceolatis ad apicem obtusis basi

cuneatis pinnatilobis, lobis utroque latere 4-5 latere superiore plus numerosis latere inferiore minus numerosis oblongo-triangularibus, lobis mediis longissimis 2 mm. longis 1 mm. latis apice obtusissimis alternis, pinnis infimis brevioribus 1 cm. longis circ. unilateralibus vel valde obliquis, pinnis mediis a rhachibus frondium angulo  $45^{\circ}$  egressis. Rhachis frondis sursum 2 mm. lata; rhachis pinnæ inferioris 2 mm. lata. Frons supra medium usque ad prope apicem sorifera, pinnis singulis generaliter latere superiore sorum singulum gerentibus, vel interdum utroque latere sorum singulum vel soros duos gerentibus. Involverum infundibulo-campanulatum  $2\frac{1}{2}$  mm. longum ore  $1\frac{1}{2}$  mm. latum utroque latere alatum, alis circ.  $\frac{1}{4}$  mm. longis, ore truncato-rotundato, valvis subnullis, iis inferioribus quam superioribus paullo longioribus margine integris. Frons utraque pagine glabra margine integra leviter obscure vel laud crispato-undulata vel plus minus desuper recurva vel laud recurva, costis venis venulis utraque pagine elevatis; cellulæ vermiformes desunt.

HAB. Arisan, ad 8000-7000 ped. alt., leg. B. HAYATA et S. SASAKI, Jan., 1912.

Near *Trichomanes humile* FORST. (HOOK. et GREV. Ic. Fil. t. 85); but differs from it in having lobes on both sides of the pinnæ. Found in a dry place under a large crag in Mt. Tōzan.

**Trichomanes filiculum** BORY (Fig. 74); MATSUM. et HAYATA Enum. Pl. Formos. p. 564.

*Trichomanes bipunctatum* POIR.; MATSUM. et HAYATA l.c. p. 564.

HAB. Kōtō-shō, leg. T. KAWAKAMI et S. SASAKI, Juli., 1912, (No. 18).



Fig. 74, *Trichomanes filiculum* BORY.



Fig. 75, *Trichomanes humile* FORST



**Trichomanes humile** FORST. (Fig. 75); MATSUM. et HAYATA Enum. Pl. Formos. p. 565.

HAB. Kōtōshō, leg. T. KAWAKAMI et S. SASAKI, Juli, 1912, (No. 21).

**Trichomanes maximum** BLUME (Fig. 76); *Trichomanes thysanostomum* HAYATA in MATSUM. et HAYATA Enum. Pl. Formos. p. 568 (non MAKINO).

HAB. Kōtōshō, leg. T. KAWAKAMI et S. SASAKI, Juli, 1912, (No. 16 et 20).

Compared with a specimen so named from the Philippines.

**Trichomanes orientale** C. CH. (Fig. 77). *Trichomanes japonicum* FR. et SAV. Enum. Pl. Jap. II. p. 207.

HAB. Arisan, ad 8000 ped. alt., leg. B. HAYATA et S. SASAKI; Rinkiho, leg. H. INABA, Aug. 1910.

**Trichomanes palmifolium** HAYATA sp. nov. (Fig. 78). Rhi-

Fig. 76, *Trichomanes maximum* BLUME.

zoma repens filiforme breve pubescens nigricans remote radicans remote foliosum. Stipes 2-7 mm. longus basi nigricans glaber filiformis. Frons in ambitu cordato-ovata vel rotundato-ovata 14 mm. longa totiusque



Fig. 77, *Trichomanes orientale* C. CH.; a, the plant; b, a portion of the frond.



lata pinnatiloba, lobis utroque latere 2-3, rhachibus 2 mm. latis, lobis obtriangulati-obcuneatis 5 mm. longis 4 mm. latis apice in ambitu truncatis basi

cuneatis apice alte duplo vel triplo lobulatis,

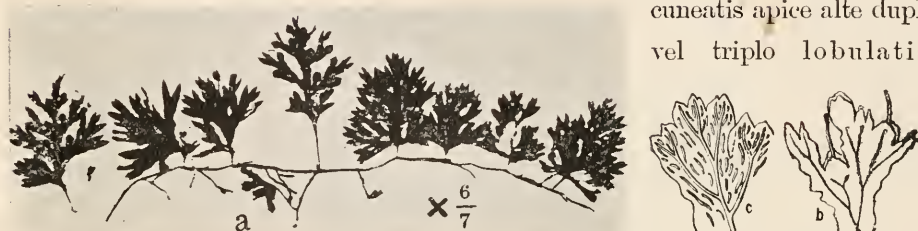


Fig. 78, *Trichomanes palmifolium* HAYATA; a, the plant; b, a portion of a frond; c, another portion of a frond, showing the vermiform strings on the latter.

lobulis ultimis 1-2 mm. longis 1-1½ mm. latis apice acutis margine leviter superiore (sursum) recurvis crispato-undulatis; frons leviter recurva vel suberecta, costis frondis lorum vel lobulorum utraque pagine elevatis, utraque pagine pilis brevissimis paucis (presertim ad costas) dispersis brevissimis apice clavatis. Involuerum ad lobulum lateralem terminale apice valvis 2 semirotundatis 1½ mm. latis ⅔ mm. longis instructum basi complanatum campanulatum, campanulis ore 1¼ mm. latis 1 mm. altis (profundis), valvis ventralibus quam iis dorsalibus paullo majoribus.

HAB. Arisan, leg. B. HAYATA et S. SASAKI, Jan., 1912.



Fig. 79, *Trichomanes rigidum* Sw.

Near *T. Makinoi* C. CH. = *T. acutum* MAKINO (Phanerog. et Pterid. I. t. 16), but differs from it by the shorter and broader fronds; from *T. proliferum*

(BEDD. Fern. South Ind. t. 262) by the much acuter lobes of the pinnæ. Also near *T. latemarginule* EATON (HK. BK. Syn. Fil. p. 79) in the general

form, but I could not satisfactorily identify our fern with it.

**Trichomanes rigidum** Sw.; (Fig. 79) MATSUM. et HAYATA Enum. Pl. Formos. p. 568.

HAB. Hieranzan, leg. B. HAYATA et S. SASAKI, Juli, 1912.

*Hymenophyllum*  
LINN.

**Hymenophyllum constrictum** HAYATA sp. nov. (Fig. 80). Rhizoma repens teres gracillimum  $\frac{1}{3}$  mm. in diametro sectionis remote radicans, radicibus pilis longioribus dense obtectis. Stipes erectus gracilis 8-9 cm. longus teres  $\frac{2}{3}$  mm. in diametro ad basin vel ad apicem virgæ dense pilosus, pilis nigro-castaneis subcrispis vel rectis 1-seriatim multice-



Fig. 80, *Hymenophyllum constrictum* HAYATA; a, the plant; b, a hair at the base of the frond; c, a portion of a pinnule.

llularibus 1-3 mm. longis. Frons triangulari-ovata 10 cm. longa totiusque lata apice acuta basi in ambitu subcordata bipinnata tri-quadri-pinnatifida, pinnis

ordinis I. mediis ovato-triangularibus a se 1 cm. remotis a rhachibus frondis 50°-60° egressis 5 cm. longis 3 cm. latis, pinnis ordinis II. infimis ab axilla inter frondem et pinnam infimam ordinis I. 5 mm. distantibus ovatis 2 cm. longis  $1\frac{1}{2}$  cm. latis apice obtusis basi oblique truncatis pinnatis vel bipinnatifidis, segmentis ultimis linearibus  $\frac{1}{2}$  mm. latis apice obtusis vel brevissime 2-lobatis vel soro terminatis, sub soro valde constrictis, partibus constrictis  $\frac{1}{4}$  mm. latis  $\frac{1}{2}$  mm. longis stipitiformibus. Frons pagine utraque glabra, costis venis ventulisque utraque elevatis, margine integra; rhachis frondis deorsum interrupte angustissime alata sursum distincte alata; rhachis pinnarum distincte alata. Involucrum ad basin 2-valvatim fissum bivalvatum terminale rotundatum latius quam longius 1 mm. longum margine subintegrum vel obscure denticulatum.

HAB. Arisan, leg. B. HAYATA et S. SASAKI, Jan., 1913.

Near *H. polyanthos*, but differs from it by the broadly round receptacles with short stalks.

**Hymenophyllum javanicum** SPRENG. (Fig. 81).

HAB. in monte Arisan, ad 7000-8000 ped. alt., leg. B. HAYATA et S. SASAKI, Jan., 1912.

Compared with a Japanese specimen so labelled in the Tōkyō herbarium. Our fern looks to be a little different from it in having much broader lobes of the pinnae.

**Hymenophyllum parallelocarpum** HAYATA sp. nov. (Fig. 82). Rhizoma repens gracillimum  $\frac{1}{2}$  mm. in diametro sectionis teres rubescens piloso-squamatum, pilis nigro-castaneis, remote radicans, radicibus pilosis. Stipes cum fronde perpendiculariter pendulus 2-2 $\frac{1}{2}$  cm. longus gracillimus atro-castaneus glaber basi piloso-squamatus, squamis piliformibus nigro-castaneis. Frons oblongo-lanceolata vel obovato-lanceolata



Fig. 81, *Hymenophyllum javanicum* SPRENG.



10 cm. longa 4 cm. lata apice obtuso-acuta basi in ambitu cuneato-acuta bipinnatifida, pinnis mediis longissimis a se 8 mm. remotis angulo  $45^{\circ}$ – $50^{\circ}$  a rhachibus egressis lineari-lanceolatis 3 cm. longis 12 mm. latis apice obtusis oblique cuneatis sessilibus, pinnulis vel segmentis linearibus inferioribus a se 3–4 mm.



Fig. 82, *Hymenophyllum parallelourpum* HAYATA; a, the plant; b, a portion of a pinna.

remotis 6–7 mm. longis 2-lobatis vel simplicibus, lobis linearibus 2 mm. longis 1 mm. latis apice truncato-rotundatis vel leviter emarginatis vel apice soro terminatis, segmentis vel lobis soriferis apice sub soro plus minus constrictis æquilatis cum involuero. Frons integra pallido-fusca utraque glabra, costis venis

utraqne pagine distincte elevatis rubro-castaneis glabris; rhachis frondis alata medio cum alis 1 mm. lata vel latior. Involucrum late

rotundatum vel rotundato-semi-orbiculare basi truncatum laud constrictum minus 1 mm. latum margine integerrimum apice perfecte rotundatum minus 1 mm. longum latius quam longius glabrum usque ad basin 2-valvatum fissum.

HAB. Arisan, ad 8000 ped. alt., leg. B. HAYATA et S. SASAKI, 1912, Jan.

Near *H. rarum* R. BR. (KUNZE Farnkräuter I. t. 96), but differs from it by the much more branched fronds. Also near *H. Wrightii* V. D. BOSCH, (MAKINO Phanerog. et Pterid. Vol. I. t. 17.), but separable from it by the more pinnatifid pinnae.

### **Hymenophyllum polyanthos Sw.**

HAB. Arisan, ad 7000 ped. alt., leg. B. HAYATA et S. SASAKI, Jan., 1912.



Compared with a specimen so labelled in the Tōkyō herbarium. This fern seems to vary a very wide range.

## Polypodiaceæ.

### *Cystopteris* BERNHARD.

***Cystopteris formosana* HAYATA** sp. nov.  
(Fig. 83). Rhizoma repens  
4 mm. crassum radices dense  
emittens. Stipes tenuissi-  
mus 30 cm. longus inferiore

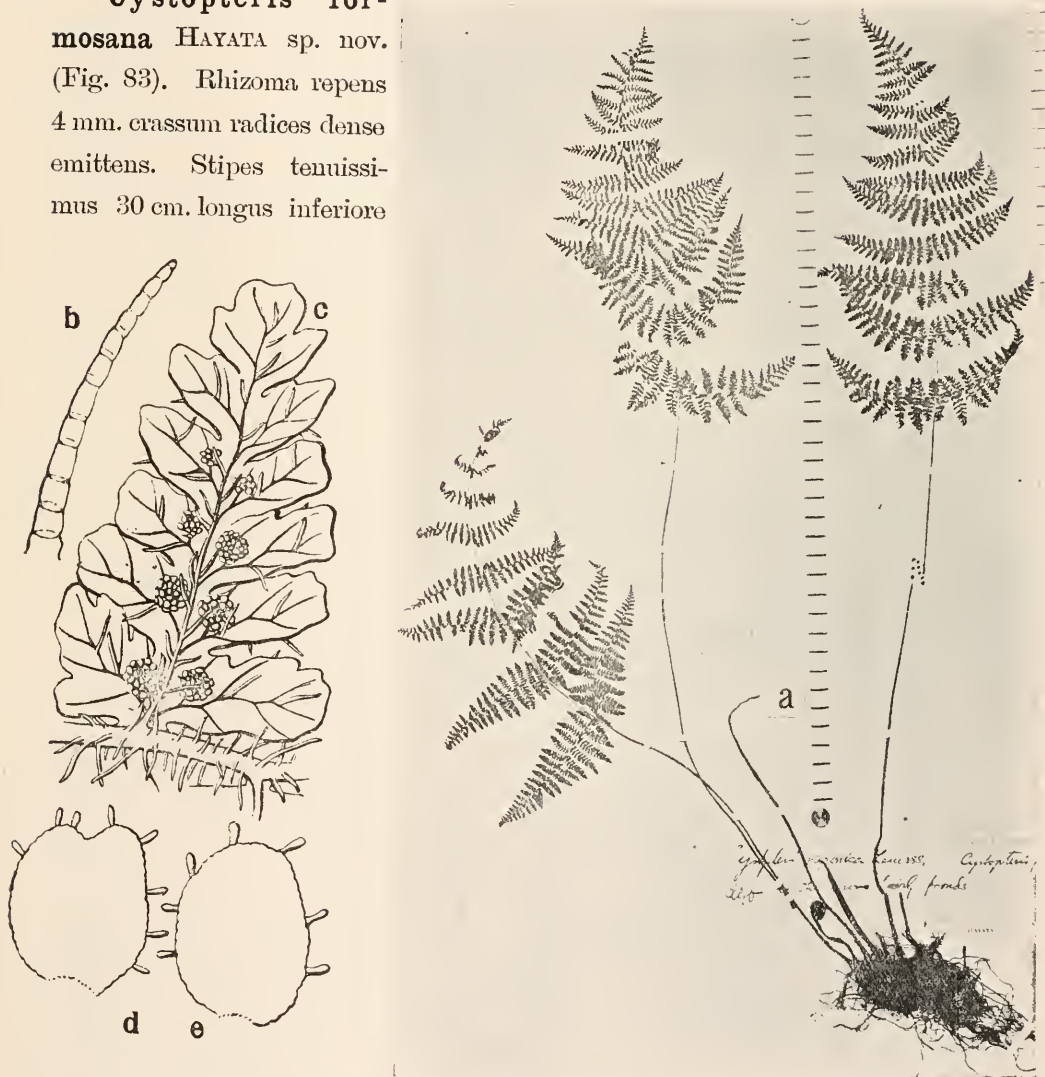


Fig. 83, *Cystopteris formosana* HAYATA; a, the plant b, a hair on the surface of the frond; c, a pinnule; d and e, indusia.

2 mm. in diametro teres basi castaneus sursum flavo-stramineus piloso-squamatus paucè pilosus basi dense sursum paucè squamatus, squamis mediis triangulari-lanceolatis, inferioribus triangulari-cuspidatis 5 mm. longis basi 2 mm. latis basi latissimis, superioribus minoribus tenuissimis margine glanduloso-ciliolatis, pilis tenuissimis multi-cellularibus. Frons ovato-lanceolata vel triangulari-lanceolata 22 cm. longa 10-12 cm. lata apice ambitu acuminata basi truncata vel rotundata bipinnata, pinnis inferioribus longioribus suboppositis a se 3 cm. remotis a rhachibus angulo  $80^{\circ}$ - $90^{\circ}$  divaricatis rectis vel  $\pm$  recurvis sessilibus lanceolatis 7 cm. longis 3 cm. latis apice acuminatis basi truncatis æquilateralibus, pinnulis inferioribus a rhachibus angulo recto divaricatis lineari-oblongis 18 mm. longis 7 mm. latis a se 7 mm. remotis apice obtusis basi truncato-acutis sessilibus pinnatifidis inferiore ad costam superiore prope costam fidis, segmentis rectangularibus 4 mm. longis basi circ. 2 mm. latis apice truncatis margine lobulatis, lobulis apice rotundatis  $\frac{1}{2}$  mm. latis, segmentis superioribus brevioribus subintegris. Textura tenuissime herbacea; frons pallido-viridis, rhachibus frondium breve pilosis; costulæ pinnularum supra leviter canaliculatæ utroque latere canaliculorum densiuscule pilosæ supra elevatæ; pagina frondis densiuscule pilosa, pilis articulatis multicellularibus, venis et venulis utraque pagine parce pilosis. Sori utroque latere costæ pinnularum prope costam 1-seriatim dispositi globosi. Indusium oblongum margine remote glanduloso-ciliolatum.

HAB. Arisan, ad 7000 ped. alt., leg. B. HAYATA et S. SASAKI, Jan., 1912.

Near *C. japonica* LEURS., but differs from it by the more hairy fronds; still nearer *C. setosa* (BEDD.) (BEDD. Fern. Br. Ind. t. 312 and *Lastrea setosa* BEDD. Fern. Brit. Ind. t. 262), from which this differs by the oblong nearly orbicular indusium with glanduliferous margin and by the very much smaller fronds. Perhaps a smaller form of *C. setosa*.

**Cystopteris sphærocarpa** HAYATA sp. nov. (Fig. 84). Rhizoma. Stipes stramineus flexuosus 18 cm. longus basi parce squamatus nitidus, squamis ovato-oblongis vel ovatis 4 mm. longis  $1\frac{1}{2}$ -2 mm. latis apice acuminatis basi rotundatis tenuissimis fusco-purpurascens. Frons triangularis 12 cm. longa 10 cm. lata basi latissima apice tenuissime lineari-acuminatissima pinnata, pinnis inferioribus longioribus lanceolatis  $3\frac{1}{2}$  cm. longis a se  $1\frac{1}{2}$  cm. remotis

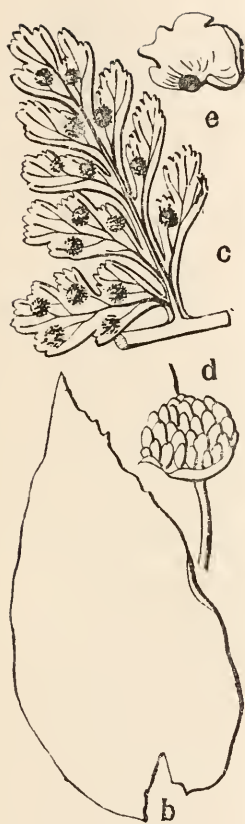


Fig. 84, *Cystopteris sphaerocarpa* HAYATA; a, the plant; b, a scale on the stipe; c, a pinnule; d, a sorus; e, an indusium.

a rhachibus frondium angulo  $90^{\circ}$  divaricatis, infimis valde longissimis lanceolatis  $5\frac{1}{2}$  cm. longis 23 mm. latis apice acutis ad summum obtusis basi truncatis plus minus angustioribus brevissime petiolatis, pinnulis inferioribus a se 18 mm. remotis oblique ovatis 12 mm. longis 7 mm. latis apice ambitu rotundatis basi late oblique cuneatis brevissime petiolulatis lobulatis, lobulis oblongis margine minute denticulatis, partibus cuneatis integris. Textura herbaceo-membranacea. Sori basi lobulorum singuli globosi. Indusium late rotundatum margine irregulariter erosum.

HAB. in monte Morrison, ad 11000 ped. alt., leg. T. KAWAKAMI et S. SASAKI, Oct., 1909.

Near *Cystopteris fragilis* BERNH., but differs from it by the broader, shorter fronds with more obtusely lobed pinnules. Also near *C. tenuis* (LOWE Brit. Exot. Fern. Vol. VII. p. 35) from which this differs by the triangular bipinnate fronds; from *C. moupinensis* (FRANCHET Pl. DAVID. II. p. 149), this is separable in the bipinnate (but not tripinnate) fronds.

***Dryopteris* ADANSON.**

***Dryopteris* (*Ctenitis*) *angustodissecta***

HAYATA sp. nov. (Fig. 85). Rhizoma? Stipes 20 cm. longus ferrugineo-rubro-castaneus pubescens, pilis pluricellularibus rubescentibus, basi densiuscule sursum parce squamatus, squamis inferioribus ovato-lanceolatis 6–8 mm. longis 1–2 mm. latis. Frons elongato-triangulari-ovata 45 cm. longa basi latissima 22 cm. lata apice triangulari-acuminata basi acuto-truncata bipinnata vel tripinnatifida, pinnis inferioribus oppositis a se 5–6 cm. remotis angulo 80°–90° a rhachibus divaricatis,

infinis lanceolato-triangularibus 13–14 cm. longis basi 8–9 cm. latis apice acuminatis basi latissimis breve petiolatis (petiolis 8 mm. longis), pinnulis infimis latere inferiore praesertim longissimis 6 cm. longis 2 cm. latis lineari-lanceolatis apice acu-

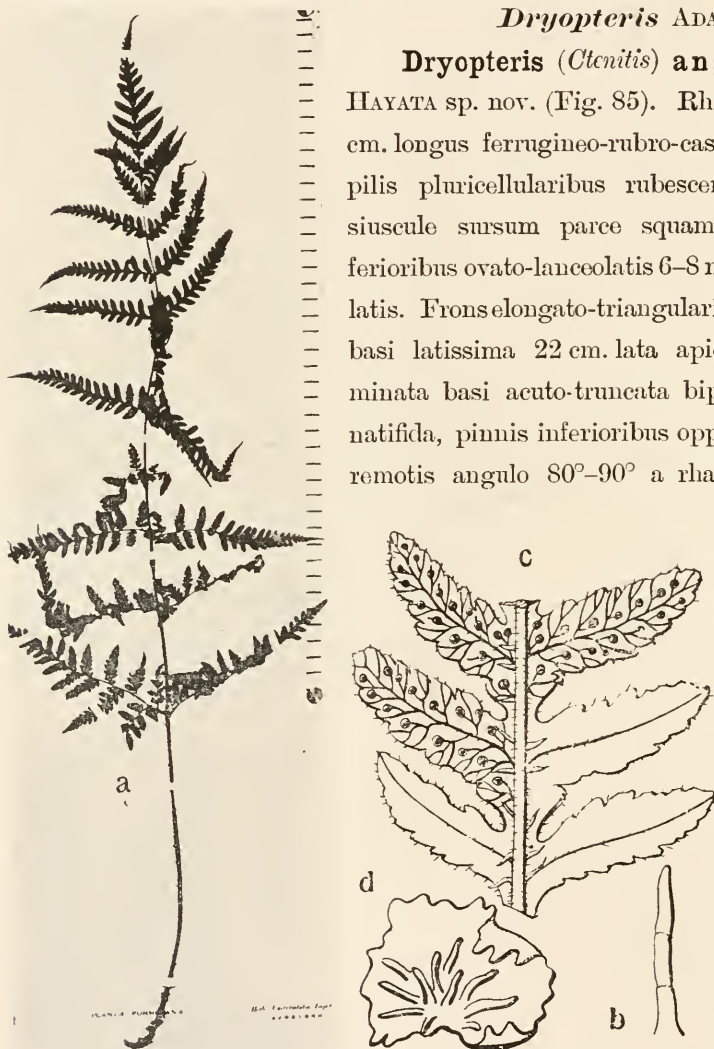


Fig. 85, *Dryopteris* (*Ctenitis*) *angustodissecta* HAYATA; a, the plant; b, a hair on the costa of a pinnule; c, a portion of a pinnule; d, an indusium.



minatis basi truncatis latissimis sessilibus basi pinnatis sursum pinnatifidis, pinnulis ordinis secundarii vel segmentis inferioribus ovato-triangularibus 1 cm. longis 7 mm. latis apice obtusis basi truncatis latissimis sessilibus vel breve petiolulatis margine lobulatis; frons basi usque ad summum sorifera herbacea supra pubescens subtus ad costam costulas venas venulasque tenuiter pubescens, pilis pluri-cellularibus. Sori utroque latere costulæ pinnularum vel segmentorum 1-seriatim dispositi. Indusium subreniforme ad centrum pilosum.

HAB. Kō-shūn: Kuraru, leg. B. HAYATA et S. SASAKI, Mai. 1912.

Near *D. dissecta* (DESY.); but differs from it by the much narrower pinnae and pinnules with narrower lobes.

**Dryopteris**  
(*Lastrea*) **apiciflora** (WALL.) O. Ktze. (Fig. 86);  
HOOK. Sp. Fil. VI. t. 248.

*Lastrea apiciflora* (HOOK.) BEDD. Fern. Brit. Ind. t. 40.



Fig. 86, *Dryopteris* (*Ctenitis*) *apiciflora*; a, the plant; b, a scale on the under surface of a costa of a pinna; c, a hair on the upper surface of a costa of a pinna; d, portion of a pinna; e, a sori; f, an indusium.

HAB. Arisan, ad 7000-6000 ped. alt., leg. B. HAYATA et S. SASAKI, Jan. 1912.  
Epiphytica vel terrestris.



Fig 87, *Dryopteris* (*Lastrea*) *aurita* C. CH.; 'a, the plant; b, a scale on the rhizome; c, basal part of the same; d, basal part of a pinna.



Fig. 88-A, *Dryopteris crenata* C. CH.; a, the plant.

***Dryopteris* (*Lastrea*) *aurita* C. CHR.** (Fig. 87) Ind. Fil. p. 253 (1905).

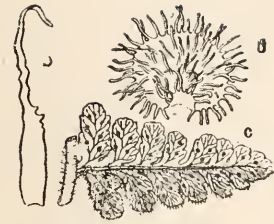


Fig. 88-B, *Dryopteris crenata* O. KTZE.; b, a scale at the base of the stipe; c, pinule; d, an indusium.

*Gymnogramme aurita* HOOK. Ic. t. 974. *Aspidium aurita* (HOOK.); MATSUM. et HAYATA Enum. Pl. Formos. p. 579.

HAB. Rahao, leg. T. SÔMA, 1910. Dec.

***Dryopteris* (*Eudryopteris*) *crenata* O. KTZE.** (Fig. 88, A-B).

*Hypodematium Rüppellianum* KUNZE Farnk-räuter I. p. 41, t. 21 (1840).

*Nephrodium odoratum* BAKER Syn. p. 280.

HAB. Montibus centralibus, leg. U. MORI et S. KATÔ, Dec. 1909.

It is rather doubtful that this is identical with *D. crenata*, for there is a little difference regarding the size of the stipes and the hairy state of the fronds. This slightly differs from the Japanese specimen labelled *N. odoratum* BAKER. The sori of our fern are much larger than those of the Japanese.

***Dryopteris* (*Eudryopteris*) *cyrtolepis* HAYATA** sp. nov. (Fig. 89). Rhizoma? Stipes 27 cm. longus basi 1 cm. in diametro cum rhachibus densiuscule squamatus, squamis variabilibus lanceolatis usque filiformibus basi densissime dispositis usque 2 cm. longis castaneis. Frons in ambitu lanceolata 100 cm. longa 30 cm. lata apice subito acuminata basi gradatim angusta ad basin 10 cm. lata pinnata, pinnis linearibus mediis longissimis 15 cm. longis 2 cm. latis a se 3 cm. remotis suboppositis apice acuminatis basi latissimis truncatis pinnatifidis basi ad rhachin fissis sursum prope rhachin fissis, segmentis

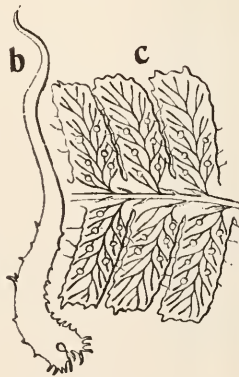


Fig. 89, *Dryopteris cyrtolepis* HAYATA; a, the plant; b, a scale on the frond-rhachis; c, portion of a pinna.



inferioribus rectangularibus 1 cm. longis 5 mm. latis apice truncatis margineo obscure et remote serrulatis vel subintegris apice obscure denticulatis. Pinnæ medio deorsum a rhachibus frondis angulo recto divaricatæ apice plus minus falcato-ascendentes, inferioribus a se 3 cm. remotis brevioribus plus minus reflexis, infimis 6 cm. longis  $1\frac{1}{2}$  cm. latis, superioribus ascendentibus a rhachibus frondium  $50^{\circ}$ – $60^{\circ}$  divaricatis brevioribus a se approximatis, segmentis a costa pinnae angulo  $80^{\circ}$  egressis. Costæ pinnae supra leviter canaliculatæ squamis minutis obtectæ, subtus elevatæ squamis majoribus densiuscule obtectæ, costulis segmentorum supra tenuiter impressis subtus tenuiter elevatis, venis venulis supra non visis, subtus distincte visis tenuissimis. Frons herbaceo-coriacea

supra subglabra subtus ad venas paucè squamata vel subglabra margine pilis tenuissimis longissimis paucè instructa. Sori utroque latere costæ segmentorum 1-seriatim dispositi. Indusium cordato-reniforme.

HAB. Mt. Arisan, leg. B. HAYATA et S. SASAKI. Jan., 1912.

***Dryopteris* (*Ctenitis*) *Eatoni* (BAK.) O. KTZE. (Fig. 90).**

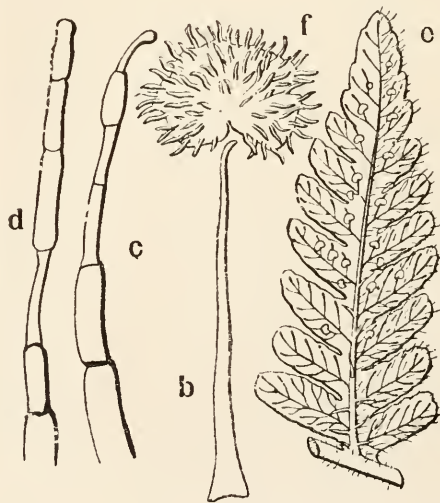


Fig. 90, *Dryopteris Eatoni* O. KTZE.; a, the plant; b, a scale at the base of the stipe; c, d, hairs on the frond; e, a pinnule; f, an indusium.



HAB. Kōtōshō, leg. K. MIYAKE, Nov., 1899.

Compared with a specimen so labelled from the Philippines.

**Dryopteris** (*Lastrea*) **Beddomei**  
(BAK.) O. KTZE. (Fig.  
91).

HAB. Rinkihō, ad  
7000 ped. alt., Aug.  
1911, leg. H. INABA.

**Dryopteris** (*Lastrea*)  
**gracilescens**  
(BL.) O. KTZE. (Fig.  
92).

HAB. Arisan, leg.  
B. HAYATA et S. SASAKI  
Jan., 1912.

Compared with a  
specimen so labelled  
in the herbarium of  
Tōkyō.



Fig. 91, *Dryopteris* (*Lastrea*) *Beddomei*  
O. Ktze.; c, the plant; b, a pinna.

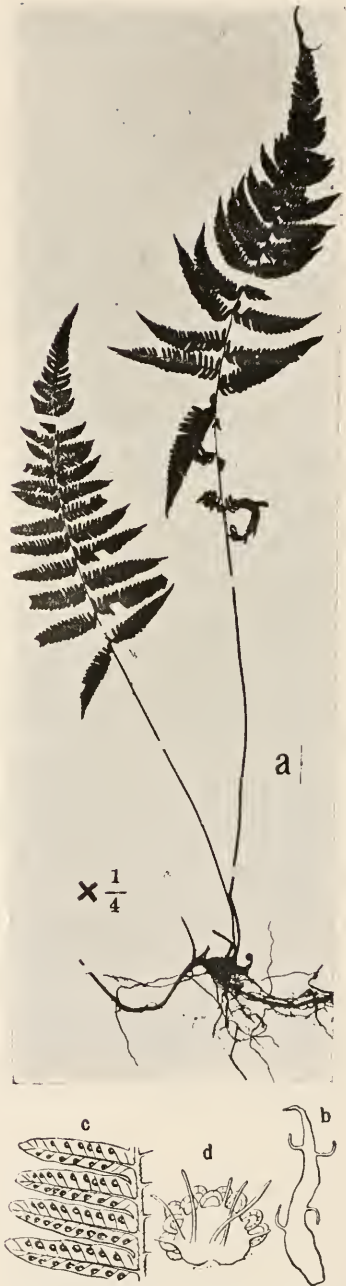


Fig. 92, *Dryopteris* (*Lastrea*)  
*gracilescens* O. Ktze.; a, the plant; b, a  
scale; c, portion of a pinna; d, a sorus.

**Dryopteris** (*Eudryopteris*) **hirtipes**  
(Bl.) O. Ktze. (Fig. 93).

HAB. Arisan, leg. B. Hayata et S. Sasaki, Jan. 1912.

Compared with a specimen so labelled in the herbarium of Tōkyō.

**Dryopteris** (*Phlegopteris*) **fluvialis**  
Hayata sp. nov. (Fig. 94). Rhizoma ascendens suberectum. Stipes 50–60 cm. longus basi pauce squamatus toto glaberrimus, squamis cuspidato-ovatis 3 mm. longis 2 mm. latis integris apice acuminato-cuspidatis basi  $\pm$  cordatis. Frons 65 mm. longa 50 cm. lata ovato-triangularis apice acuminata infra medium latissima basi minus lata basi subtruncata bipinnata vel tripinnata, pinnis infimis 30 cm. longis 10 cm. latis lineari-lanceolatis apice acuminatissimis basi truncatis subsessilibus vel brevissime petiolatis, pinnulis ordinis primarii infimis lanceolatis sessilibus 8 cm. longis  $2\frac{1}{2}$  cm. latis apice acuminatissimis basi truncatis, pinnulis ordinis secundarii infimis oblongo-lanceolatis 18 mm. longis 8 mm. latis apice obtusissimis basi leviter adnatis margine lobulatis, lobulis quadrangularibus 3 mm. longis 2 mm. latis apice truncatis a rhachibus 1 mm. distantibus utroque latere costularum 1-seriatim soriferis; frons textura tenuiter herbacea, in exsiccatō fuscens. Pinnæ inferiores a se

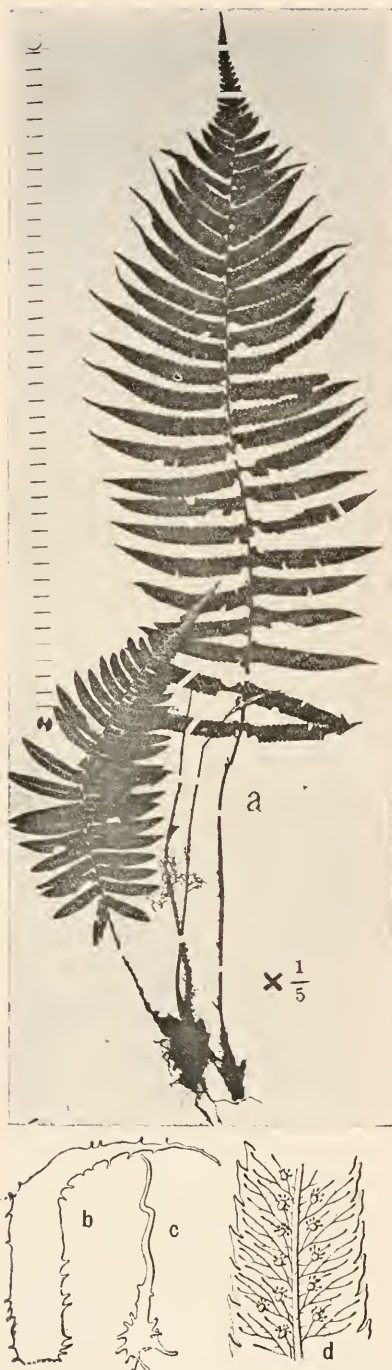


Fig. 93, *Dryopteris hirtipes* O. Ktze.; a, the plant; b, a scale on the stipe; c, a scale on the rhachis, smaller one; d, a portion of a pinna.

10 cm. remotæ a rhachibus frondium angulo  $40^{\circ}$ – $50^{\circ}$  divaricatæ, pinnulis ordinis primarii inferioribus a se 3 cm. remotis a rachibus pinnarum  $70^{\circ}$ – $80^{\circ}$  divaricatis, pinnulis ordinis secundarii inferioribus a se 1 cm. remotis a rhachibus



Fig. 94, *Dryopteris fluviatilis* HAYATA; a, a smaller specimen of the plant; b, a larger one; c, a scale on the rhizome; d, a pinnule; e, portion of a setulose costula (upper surface).



pinnularum angulo recto egressis; costis pinnularum supra canaliculatis utroque latere canaliculorum alato-costulatis, costulis remote setuliferis, setulis complanatis  $\frac{1}{2}$  mm. longis. Sori rotundati laud involuerati. Indusium nullum.

HAB. Arisan, secus fossas, ad 7-8000 ped. alt., leg. B. HAYATA et S. SASAKI, 1912, Jan.

Near *D. crenulato-serrulata* C. CH., but differs from it by the much fewer scales at the base of the stipes and much larger fronds.

**Dryopteris** (*Eudryopteris*) **hypophlebia** HAYATA sp. nov. (Fig. 95). Rhizoma suberectum apice stipites cæspitosos gerens. Stipes 15-20 cm. longus sursum paucè basi densissime squamatus, squamis inferioribus ovatis lanceolatis

tenuissimis castaneis fuscis usque  $1\frac{1}{2}$  cm. longis 4 mm. latis apice longe cuspidato-acuminatis margine subintegris, squamis (ad rhachin) minoribus cuspidato-ovatis 3 mm. longis 1 mm. latis margine remote setosis fusco-nigricanti-



Fig. 95, *Dryopteris hypophlebia* HAYATA; a, the plant; b, a scale on the rhizome; c, a pinna.



bus. Frons ovato-lanceolata 30 cm. longa 13 cm. lata apice acuminata basi truncata pinnata, pinnis superioribus brevioribus, inferioribus longioribus subæquilongis a se 4 cm. remotis suboppositis a rhachibus angulo  $50^{\circ}$ – $80^{\circ}$  divaricatis pyramidali-lanceolatis 8 cm. longis  $2\frac{1}{2}$  cm. latis subsessilibus vel breve petiolatis (petiolis 3 mm. longis) inæqualibus, latere superiore quam latere inferiore angustioribus, pinnatis vel pinnatifidis, segmentis infimis (latere inferiore) longissimis  $1\frac{1}{2}$  cm. longis 8 mm. latis oblongo-rectangularibus apice rotundatis basi truncato-contractis margine inferiore lobulatis superiore duplicato-serrulatis; textura coriacea; costæ pinnarum basi  $\pm$  canaliculatæ sursum planæ distincte coloratæ subtus elevatæ  $\pm$  squamatæ, costulis venis venulisque supra impressis subtus leviter elevatis distincte coloratis distincte visis tenuissimis; pagina supra viridissima subtus pallidior. Sori utroque latere costulæ segmentorum 1-seriatim a basi usque medium frondis dispositi. Indusium cordatum.

HAB. Arisan, leg.  
B. HAYATA et S. SASAKI,  
Jan., 1912.

**Dryopteris** (*Ctenitis*) **Kawakamii**  
HAYATA (Fig. 96),  
Mater. Fl. Formos. p.  
416. Stipites erecti  
14 cm. longi dorso  
(supra) 3-sulcati  
stramineo - rubescentes  
squamati, (squamis  
copiosis imbricatis in

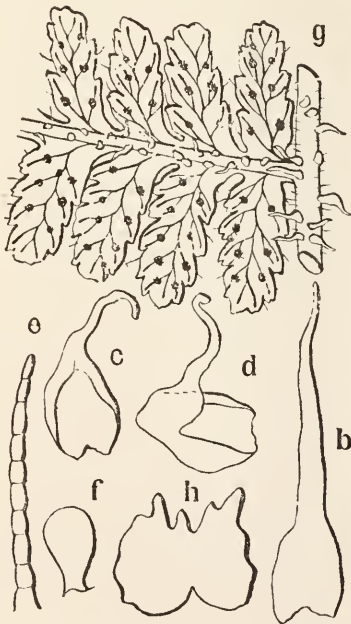


Fig. 96, *Dryopteris* (*Ctenitis*) *Kawakamii* HAYATA; a, the plant; b, a scale on the stipe; c, d, scales on the costa of a pinna; e, a hair on the upper surface of the costa of a pinna; f, a glandular hair on the under surface of the costa of a pinna; g, basal portion of an upper pinna h, an indusium.

magnitudine variabilibus lineari-cuspidatis acuminatis fusco-stramineis 8-9 mm. longis 1 mm. latis interdum basi cordatis), etiamque pilis crispatis dense obtekti. Frondes lanceolatae in ambitu 50 cm. longae 15 cm. latae apice acuminatae basi obtusae bipinnatae, pinnis lateralibus angusto-lanceolatis sessilibus, superioribus a rhachibus angulo 90° patentibus, inferioribus et infimis reflexis, pinnis sub pinna media frondis longissimis 10 cm. longis 2 cm. latis apice acuminato-linearibus a medio usque ad basin aequilatis, pinnis infimis brevissimis reflexis angulo 150° a rhachibus patentibus 2½ cm. longis 1 cm. latis, pinnis utroque latere frondium 30 a se 1-1½ cm. remotis; rhaches supra sulcatae pilosae squamatae, rhachillae supra sulcatae dense rubro-hirsutae subtus paucissime pilosae squamis lanceolatis 1-2 mm. longis basi ventricosis instructae; pinnulae ad medium pinnarum late lineares 1 cm. longae 3 mm. latae sessiles aequilatae obtuse dentatae, (dentibus utroque latere 3-4-5 plus minus ascendentibus vel transversis obscuris), supra densiuscule subtus parcissime strigoso-pilosae, (pilis rigidis crispatis 1 mm. longis), margine plus minus revolutae, (venulis liberis), sub quoque dente 1-soriferae, rarius 2-soriferae. Sori depresso-orbiculares 1 mm. in diametro, receptaculis a margine ½ mm. remotis, indusiis generaliter obsoletis rarius late orbicularibus cordatis.

HAB. Randaisan, leg. U. MORI, 1908, Aug. (No. 7134).

**Dryopteris** (*Eudryopteris*) **Kodamai** HAYATA sp. nov. (Fig. 97). Rhizoma? Stipes 14 cm. longus tereto-complanatus basi dense squamifer, squamis inferioribus maximis 1½ cm. longis 2 mm. latis linearibus acuminatis, sursum glabratus. Frons triangularis vel late pentagona 15 cm. longa totiusque lata vel latior apice triangulari-acuta basi latissima bi-tri-pinnata, pinnis suboppositis (pinnis inferioribus bipinnatis, pinnis superioribus pinnatis), pinnis infimis longissimis 10 cm. longis bipinnatis vel bipartitis petiolatis, (petiolis 1 cm. longis), partibus inferioribus (vel pinnulis infimis) cum superioribus aequilongis vel brevioribus 8 cm. longis lanceolatis pinnatis, pinnulis lanceolatis inferioribus 1½ cm. longis 5 mm. latis apice obtusis basi cuneatis basi ± adnatis sessilibus margine duplicato-serratis, serris aristatis; frons a medio sursum sorifera; sori utroque latere pinnularum 1-seriatim siti; pinnis inferioribus a se 2-3 cm. remotis angulo 45° a rachibus frondium divaricatis, pinnulis in-

ferioribus primariis vel secundariis inferioribus a se 5 mm. remotis a rhachibus angulo  $60^{\circ}$  egressis; textura herbaceo-coriacea. Costulæ pinnularum supra canaliculatæ utroque latere canaliculorum interrupte costulatæ. Sori valde elevati globosi. Indusium cordatum globosum 1 mm. in diametro.

HAB. In monte Taiton, ad 1200 metra alt., leg. U. FAURIE, 1903, mai.

Remarkable for the very much elevated sori.

**Dryopteris** (*Ctenitis*) **kusukusensis** HAYATA sp. nov. (Fig. 98). Rhizoma? Stipes rhachibus costis venisque totis castaneorubescens sub lente minute pubescens, pilis pluricellularibus, 30 cm. longus basi dense sursum parce squamatus,

squamis lineari-lanceolatis 5–8 mm. longis 1–2 mm. latis. Frons ovato-lanceolata 45 cm. longa 22 cm. lata apice acuminata basi in ambitu cordata pinnata vel infima bipinnatifida, pinnis inferioribus lanceolatis suboppositis a se 5 cm. remotis a rhachibus frondium angulo  $80^{\circ}$ – $70^{\circ}$  divaricatis,



Fig. 97, *Dryopteris Kodamai* HAYATA.



Fig. 98, *Dryopteris kusukusensis* HAYATA; a, the plant; b, a scale on the stipe; c, apical portion of a pinna; d, e, hairs on the frond.

pinnis infimis obliquis vel semi-triangularibus 11 cm. longis basi latissimis 9 cm. latis latere superiore 1-2 cm. latis latere inferiore 7 cm. latis basi ad costam pinnatifidis, pinnulis vel segmentis infimis (latere inferiore) longissimis lineari-lanceolatis  $7\frac{1}{2}$  cm. longis 18 mm.

latis apice acuminatis basi  $\pm$  contractis a se  $1\frac{1}{2}$  cm. remotis a costa angulo  $50^\circ$  egressis, margine regulariter lobulatis, lobulis oblongo-rectangularibus apice obtusissimis basi latissimis 6 mm. longis 4 mm. latis; textura herbacea. Frons medio sursum sorifera. Indusium rotundato-cordatum.

HAB. KUSUKUSU, Juli., 1912, leg. B. HAYATA et S. SASAKI.

Very near *D. membranoides* HAYATA, but

differs only by the thicker herbaceous texture.

***Dryopteris (Cyclosorus) lævifrons* HAYATA sp. nov.** (Fig. 99). Rhizoma? Stipes 70 cm. longus basi circ. 1 cm. in diametro squamis parcissime instructus lævis stramineus, (squamis linearibus circ. 1 cm. longis), sursum pinnis reductis auriculiformibus 2-4 instructus, auriculis triangularibus lobulatis 1 cm. longis 1 cm. latis basi non adnatis sessilibus apice obtusis vel rotundatis a se 5 cm. remotis. Frons 90 cm. longa 25 cm. lata in ambitu lanceolata apice longe acuminatissima basi acuta pinnata, pinnis subalternatis linearibus, inferioribus



longissimis infimis paullo brevioribus, superioribus gradatim brevioribus versus apicem gradatim ad lobum pinnæ terminalis abeuntibus; pinna terminali lineari lateralibus conformi pinnis mediis æquilonga, pinnis mediis linearibus 17 cm. longis 12 mm. latis apice acuminatissimis basi sessilibus vel brevissime petiolatis margine truncato-dentatis vel lobulatis, (dentibus inferioribus quadrangularibus truncatis latere superiore 1 mm. longis latere inferiore 2 mm. longis apice truncatis ad centrum emarginatis interdum versus latus superius acutis, dentibus superioribus triangularibus acutis ascendentibus), apice ad acumen subintegris. Textura membranacea, pagina glaberrima vel supra ad costam pinnæ paucissime hirsuta, costis supra elevatis tenuiter sulcatis subtus elevatis, costulis venis venulisque utraque pagine tenuiter distincte elevatis, pinnis a rhachibus frondium, et costulis a costa pinnæ circ. angulo 60° egressis, pinnis inferioribus a se 3 cm. remotis, pinnis cum rhachibus frondium articulatis in exsiccato articulatim solutis. Sori utroque latere costulæ dentium 1-2 vel 1-seriatim dispositi vel utroque latere costæ pinnæ 1-seriatim dispositi. Indusium reniforme.

HAB. Kôshûn, Kuraru, leg.  
B. HAYATA, Juli., 1912.

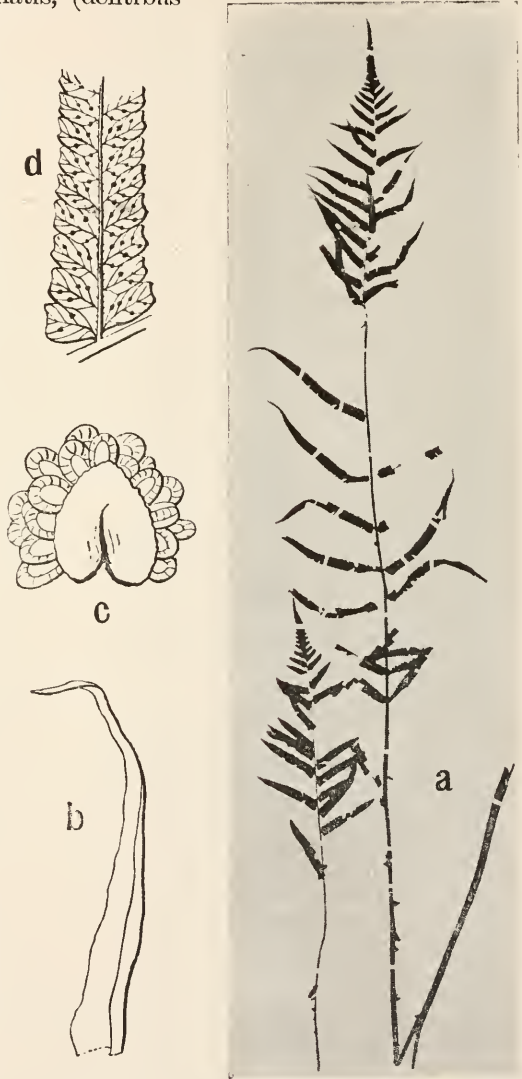


Fig. 99, *Dryopteris* (*Cyclosorus*) *lavifrons* HAYATA; a, the plant; b, a scale on the stipe; c, a sorus; d, portion of a pinna.

Near *D. truncata* O. Ktze., but differs from it by the much more smooth stipes and much more truncate lobes of the pinnae. Also near *Nephrodium eusorum* (BEDD. Fern. Brit. Ind. t. 130), but differs from it by the less divided or lobed pinnae and far much smaller form of the fronds. It bears some resemblance to *Neph. extensum* BLUME var. *minor* (BEDD. Fern. Brit. Ind. t. 201), but distinguishable from it by the truncate lobed pinnae.

**Dryopteris** (*Eudryopteris*) **thysanocarpa** HAYATA (Fig. 100) = *Athyrium*

*thysanocarpum* HAYATA. Rhizoma? Stipes 13 cm. longus tenuis-

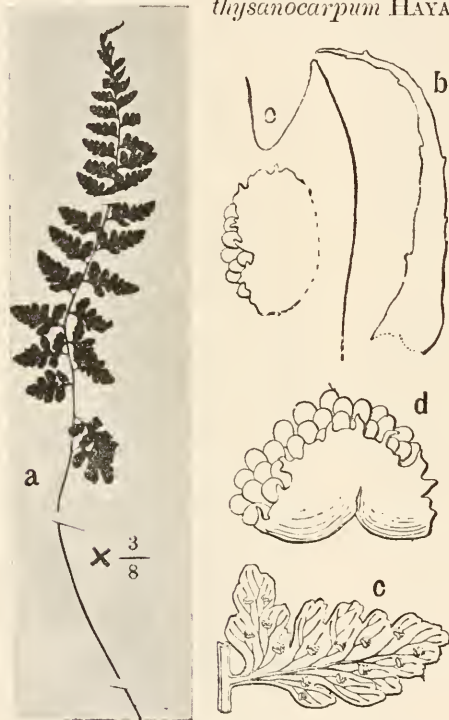


Fig. 100, *Dryopteristhysanocarpa* HAYATA; a, the plant; b, a scale on the stipe; c, a pinna; d, a sorus; e, another sorus to be found at apical portions of the frond.

simus basi dense medio parce squamatus sursum glabratus, squamis lanceolatis linearibus 2-3 mm. longis acuminatis margine integris vel  $\pm$  serrulatis. Frons lanceolata 16 cm. longa 37 mm. lata apice acuminatissima inferne aequilata basi truncata pinnata, pinnis mediis longissimis 2 cm. longis oblique triangularibus  $1\frac{1}{2}$  cm. latis latere superiore quam latere inferiore latoribus apice obtusissimis basi truncatis petiolatis (petiolis 2 mm. longis) margine inferne inciso-lobulatis superne dentato-lobulatis, lobis infimis superioribus oblongis 7 mm. longis 4 mm. latis apice rotundatis margine repandis basi cuneatis; pinnis infimis a rhachibus frondium angulo recto, superioribus angulo  $80^\circ$  divaricatis, lobis infimis pinnarum

mediarum a costa pinnae angulo recto divaricatis, pinnis inferioribus a se 12 mm. remotis, pinnis infimis  $\pm$  desuper reflexis. Textura herbacea; rhachis frondis recta. Sori utroque latere pinnae uniseriatim siti vel utroque latere lorum pinnularum uniseriatim siti elevato-globosi plus quam 1 mm. in diametro. Indusium reniforme vel rotundatum margine fimbriato-denticulatum.

HAB. Biōritsu : Rokujōdaisan, leg. U. MORI, 1908, Oct.

The fronds are exactly like those of *Microlepia Wilfordii* MOORE or *M. rhomboidea* (HOOK. 2nd Cent. Fern. t. 48), but the fructification is undoubtedly that of *Dryopteris*. Indusium is generally cordate or sometimes oblong, attaching to the fronds by one side and tends to be like that of *Athyrium*. It is especially so towards the apex of the fronds.

Near *Cystopteris Douglasii* (HOOK. Ic. Pl. t. 955) and *Cystopteris tasmanica* (HOOK. Ic. Pl. t. 955), but differs from them by the petiolate more deeply lobed or pinnatifid pinnae.

**Dryopteris** (*Eudryopteris*) **lepidopoda** HAYATA sp. nov. (Fig. 101). Rhizoma? Stipes 23 cm. longus cum rhachibus densissime squamatus, squamis lineari-lanceolatis 7 mm. longis 1-2 mm. latis apice longe acuminatis basi rotundatis remote ciliolatis vel subintegris. Frons quam stipite multo longior 50 cm. longa 23 cm. lata ovato-lanceolata pinnata, pinnis mediis longissimis lineari-lanceolatis 13 cm. longis basi latis-

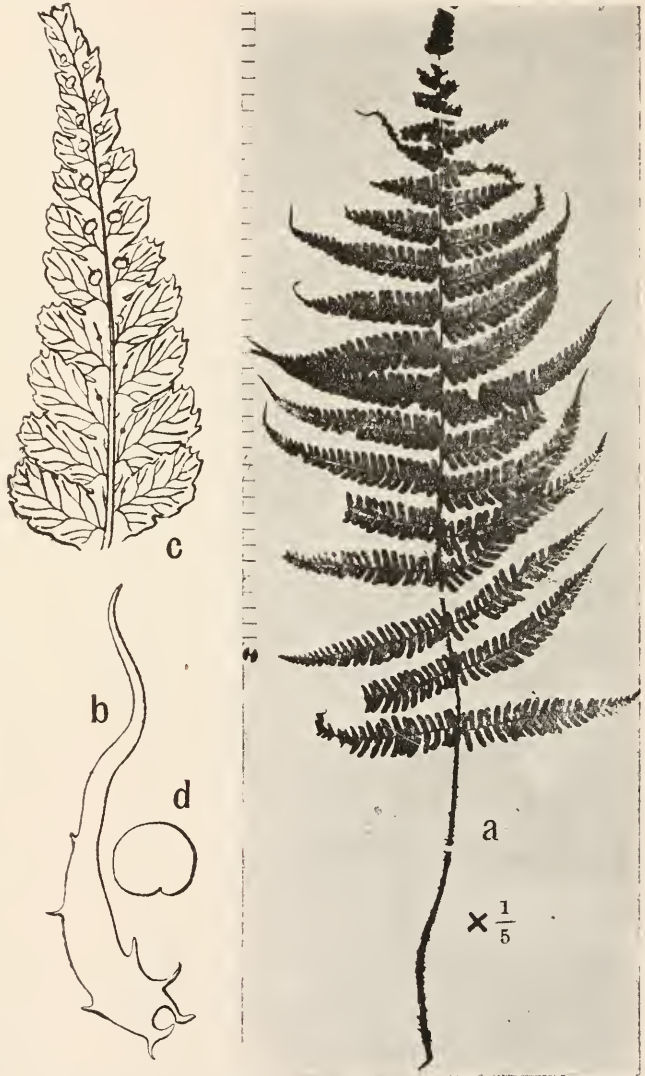


Fig. 101, *Dryopteris lepidopoda* HAYATA; a, the plant; b, a scale on the rhachis of the frond; c, apical portion of a pinna; d, an indusium.

simis  $2\frac{1}{2}$  cm. latis truncatis sessilibus a se  $2\frac{1}{2}$  cm. remotis angulo recto divari-  
catis pinnatim fidis inferiore ad rhachin fidis superiore prope rhachin fidis-  
segmentis inferioribus rectangularibus 13 mm. longis 5 mm. latis apice subtrun-  
catis vel rotundatis margine remote obscureque serrulatis vel subintegris apice



denticulatis; frons chartacea, costa pinnarum supra subplana subtus elevata, venis et venulis supra non elevatis vix visis subtus castaneo-coloratis tenuis-  
simis distincte visis. Sori utroque latere costulae segmentorum 1-seriatim dispositi.

HAB. Arisan, leg. B. HAYATA et S. SASAKI, Jan., 1912.

Near *D. pachyphylla* HAYATA, but differs from it by the thinner, less black and less ciliated scales on the rhachis, and by the thinner fronds.

**Dryopteris** (*Eudry-  
opteris*) **leptorhachia** HAYA-  
TA sp. nov. (Fig. 102).  
Rhizoma erecto-ascendens.  
Stipes cum rhachibus nitidus  
castaneus vel castaneo-rubes-  
cens 50 cm. longus inferiore  
dense superiore parce squa-  
matus, squamis inferioribus  
lineari-lanceolatis apice acu-  
minatis 2 cm. longis 2 mm.  
latis. Frons ovata 40–50 cm.  
longa 30–40 cm. lata bipin-  
nata, pinnis inferioribus  
longioribus a se 11 cm. re-  
motis angulo  $40^\circ$  a rhachibus



Fig. 102, *Dryopteris leptorhachia* HAYATA; a, the plant; b, a hair on the costa of a pinnule; c, a pinnule or a segment of a pinnule; d, e, glandular hairs on the costa of a pinnule.



egressis, infimis ovato-oblongis 25 cm. longis 12 cm. latis apice acuminatis basi rotundatis petiolatis (petiolis 2 cm. longis) pinnatis, pinnulis mediis longissimis a se 2 cm. remotis a costa pinnæ angulo  $50^{\circ}$ – $80^{\circ}$  egressis lineari-oblongis  $6\frac{1}{2}$  cm. longis 22 mm. latis apice acuminato-obtusis basi truncatis breve petiolulatis ad costas pinnatifidis, segmentis lineari-oblongis 12 mm. longis 5 mm. latis apice obtuso-rotundatis basi contractis decurrentibus lobulatis ad summum serrulatis, lobulis 1–2 mm. longis apice  $\pm$  serrulatis. Textura herbacea pagine pilis pluricellularibus parce dispersa; costa pinnularum supra canaliculata, costulæ utroque latere canaliculorum costæ sitæ lamellatæ; venis venulisque subtus distincte visis. Sori ad basin segmentorum vel lobulorum segmentorum dispositi.

HAB. Arisan, leg. B. HAYATA ]  
et S. SASAKI, Jan., 1912.

Somewhat near *D. Matsumuræ*, but differs from it by the serrulate lobes of the pinnales.

***Dryopteris* (*Otenitis*) *leucostipes*** (BAKER) C. CH. (Fig. 103, A–B), HAYATA Mater. Fl. Formos. p. 418.

HAB. Keelung.

DISTRIB. Liukiu.

***Dryopteris* (*Eudryopteris*) *melanocarpa*** HAYATA sp. nov.

(Fig. 104). Rhizoma erectum ascendens. Stipes 30–40 cm. longus rubro-castaneus basi squamatus, squamis inferioribus latissimis amplexicaulibus ovatis 7 mm.



Fig. 103-A, *Dryopteris leucostipes* C. CH.;  
a, the plant.

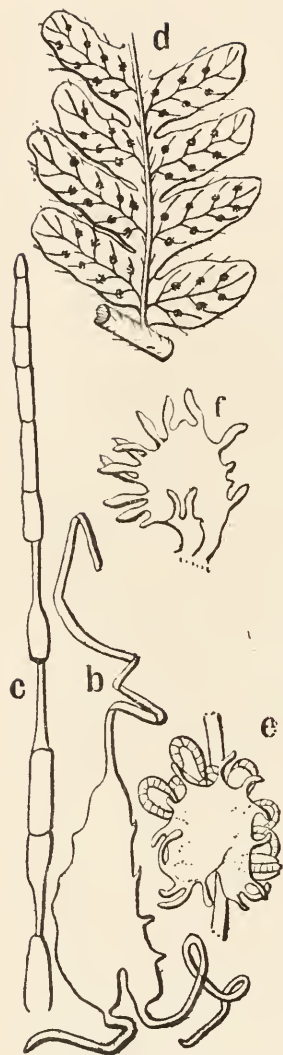


Fig. 103-B, *Dryopteris leucostipes* C. Chr.; b, a scale on the under surface of a pinna; c, a hair on the frond; d, a portion of a pinna; e, a sorus; f, an indusium.

margine duplicatoserrulatis; pinnis inferioribus a se 8 cm. remotis superioribus lanceolatis acuminatis-simis, (acuminibus linearibus serrulatis) a rhachibus

longis 3-4 mm. latis apice acutis basi roundatis integris tenuissimis stramineo-castaneis, squamis superioribus gradatim angustioribus. Fronsovata 34 cm. longa 25 cm. lata apice acuminata basi in ambitu cordata bipinnata vel bipinnatifida, pinnis suboppositis, infimis longissimis 17 cm. longis versus apicem valde falcatis hastato-bipartitis, pinnis reliquis triangulari-lanceolatis falcatis, pinnis infimis 17 cm. longis longissimis breve petiolatis falcatis hastato-bipartitis, partibus inferioribus lanceolatis 9-10 cm. longis  $2\frac{1}{2}$  cm. latis apice acuminatis basi truncatis subsessilibus superiore falcatis pinnatifidis, segmentis infimis oblongis  $1\frac{1}{2}$  cm. longis 6 mm. latis apice obtusissimis basi cuneatis latere inferiore ad rhachin decurrentibus

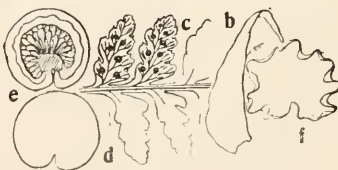


Fig. 104, *Dryopteris melano-carpa* Hayata; a, the plant; b, a scale on the rhizome; c, portion of a pinnule; d, a sorus, seen from above; e, the same, seen from below; f, an indusium after dispersion of spores.

frondium angulo  $70^{\circ}$  divaricatis, pinnulis inferioribus a se 2 cm. remotis, partibus pinnæ infimæ retrorsum reflexis falcatis. Sori valde elevato-globosi; indusia reniformi-cordata 1 mm. lata. Textura herbaceo-membranacea.

HAB. Arisan, leg. B. HAYATA et S. SASAKI, Jan., 1912.

Near *D. Sabaci* in the outline of the fronds and globose elevate sori; but differs from it by the much more acuminate pinnæ. This is still nearer to *D. sparsa* O. KUNTZE (*Nephrodium sparsum* DON), but distinguishable from it by the lowest pinnæ with much longer pinnules.

**Dryopteris** (*Eudryopteris*) **membranoides** HAYATA sp. nov. (Fig. 105). Rhizoma erectum. Stipes 30 cm. longus squamatus cum rhachibus et costis pinnarum castaneo-rubescens breve pubescens, squamis lineari-lanceolatis 1 cm. longis 1-2 cm. latis acuminatis. Frons ovato-lanceolata 60 cm. longa 30 cm. lata infra medium latissima pinnata vel infima bipinnatifida, pinnis inferioribus lineari-lanceolatis sessilibus a se 4 cm. remotis a rhachibus frondium angulo  $80^{\circ}$ - $90^{\circ}$  egressis, infimis oblique triangularibus vel semi-triangularibus 14 cm. longis basi 11 cm. latis latere superiore 2 cm. latis latere inferiore 8 cm. latis basi ad costam pinnatifidis, segmentis infimis (latere



Fig. 105, *Dryopteris membranoides* HAYATA; a, the plant; b, a scale at the apex of the rhizome; c, a hair on the under side of the costa of a pinnule; d, a portion of a pinnule; e, an indusium.



inferiore) longissimis a costa pinnæ angulo  $80^{\circ}$  egressis lanceolatis 8 cm. longis medio  $2\frac{1}{3}$  cm. latis basi  $\pm$  contractis margine pinnatim lobulatis, lobulis lineari-oblongis longissimis  $1\frac{1}{2}$  cm. longis 5 mm. latis apice obtusissimis, sinibus inter lobulos obtusis, margine integris. Textura tenuissime membranacea parcissime pubescens, pilis pluricellularibus, venis venulisque utraque pagine elevatis tenuissimis distincte visis subtus pilis dispersis. Indusium cordatum tenuissimum.

HAB. Urai : Rahao, leg. K.

MIYAKE, Oct., 1899.

Near *Lastrea melanopus* (Hook.) (BEDD. Fern. Brit. Ind. t. 38), but differs from that by the far more larger fronds with bipinnatifid lowest pinnae; also near *Dictyopteris tenerifrons* (Hook.) (BEDD. Fern. Brit. Ind. t. 4) and *Pleocnemia membranifolium* PRESL. (BEDD. Handb. Fern. Brit. Ind. p. 227, fig. n. 115), but differs from the latter by the longer fronds with castaneous scales.

**Dryopteris** (*Eulbryopteris*) **morrisonensis** HAYATA Mater. Fl. Formos. p. 450. *Dryopteris spinulosa* O. Ktze. var. *morrisonensis* HAYATA Mater. Fl. Formos. p. 422.

HAB. Monte Morrison, ad 12000 ped. alt., leg. T. KAWAKAMI et U. MORI, 1906, Oct. (No. 2500).



Fig. 106, *Dryopteris nigrisquama* HAYATA; a, the plant; b, a scale at the base of the stipe; c, a scale on the frond rhachis; d, a scale on a pinna; e, a hair on a pinna; f, basal portion of a pinna; g, middle portion of the same.



**Dryopteris** (*Eudryopteris*) **nigrisquama** HAYATA sp. nov. (Fig. 106). Rhizoma? Stipes 30 cm. longus basi dense sursum sparse squamatus, squamis totis nigris inferioribus majoribus oblongis lanceolatis triangulari-lanceolatis usque  $1\frac{1}{2}$  cm. longis usque 4 mm. latis, superioribus minoribus apice lineari-acuminatis basi truncatis vel tenuiter cordatis margine remote setosis vel integris. Frons oblongo-lanceolata 37 cm. longa 18 cm. lata apice subito acuminata basi truncata pinnata, pinnis mediis et inferioribus longissimis a se 4 cm. longis angulo  $70^{\circ}$ – $80^{\circ}$  a rhachibus divaricatis lineari-lanceolatis sessilibus 10 cm. longis  $1\frac{1}{2}$  cm. latis apice acuminatis ad summum obtusis basi latissimis truncatis vel truncato-acutis margine grosse serratis, serris inferioribus 4 mm. latis 1 mm. longis ascendentibus apice submucronatis proximatis; pinnæ rectæ vel sursum plus minus falcatæ supra subglabræ, costis supra tenuiter impressis subtus elevatis, venis lateralibus a se 3–4 mm. remotis basi ramosis ramis liberis supra non visis subtus tenuiter visis; textura herbaceo-membranacea; pinnis suboppositis vel alternis. Rhachis frondis minute squamata. Sori utroque latere costæ pinnæ 2–3-seriatim vel sursum 1-seriatim prope costas dispositi.

HAB. Mt. Arisan, leg. B. HAYATA et S. SASAKI, Jan., 1912.

Near *D. decipiens*, but differs from it by the shape of scales and pinnæ.

**Dryopteris** (*Lastrea*) **ochthodes** C. CH. (Fig. 107), Ind. p. 280. *Lastrea ochthodes* (KUNZE) BEDD. Fern. South Ind. t. 106.



Fig. 107, *Dryopteris* (*Lastrea*) *ochthodes* C. CH.; a, the plant; b, a hair on the costa of a pinna; c, portion of a pinnule; d, an indusium

HAB. Mt. Arisan: Funkiko, Jan., 1912, leg. B. HAYATA et S. SASAKI.

Compared with a Japanese specimen in the Tōkyō herbarium. This fern is extremely variable in the size of the fronds.

**Dryopteris** (*Eudryopteris*) **pachyphylla** HAYATA sp. nov. (Fig. 108). Rhizoma? Stipes 20 cm. longus squamatus stramineus, squamis lineari-lanceolatis usque 7 mm. longis usque 1 mm. latis longe acuminatis basi rotundatis plus minus cordatis vel subpeltatis margine parce brevique ciliolatis. Frons lanceolata stipite multo longior 55 cm. longa 24 cm. lata apice cuspidato-acuminata medio deorsum requilata basi plus minus angustior truncata pinnata, pinnis mediis longissimis a se 3 cm. remotis suboppositis vel alternis angulo recto divaricatis lineari-lanceolatis 15 cm. longis 25 mm. latis apice acuminatis basi truncatis sessilibus latissimis pinnatifidis versus basin circ. ad rhachin fissis, sursum

prope rhachin fissis, segmentis inferioribus rectangularibus 14 mm. longis 5 mm. latis apice truncatis approximatis a costa pinnae angulo 80° divaricatis margine remote minuteque

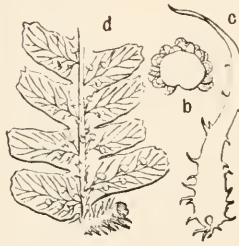


Fig. 108, *Dryopteris pachyphylla* HAYATA; a, the plant; c, a scale on the frond-rhachis; d, basal portion of a pinna; b, a sorus.

serrulatis apice denticulatis. Textura coriacea pagina supra glabra nitida subtus pallidior glabra, rhachibus densiuscule squamatis, costis primariis supra canaliculatis, subtus elevatis squamis dispositis, costulis venisque

utraque pagine non distinctis vix visis; pinnis inferioribus plus minus reflexis, pinnis superioribus gradatim ascendentibus. Sori utroque latere costæ segmentorum 1-seriatim a basi frondis sursum dispositi, prope apicem frondis desunt.

HAB. Arisan, ad 7000 ped. alt., leg. B. HAYATA et S. SASAKI, Jan. 1912.

Near *D. polylepis*, but differs from it by the much thicker coriaceous fronds with ebony black scales.

**Dryopteris** (*Eudryopteris*) **phæolepis**  
HAYATA sp. nov. (Fig. 109). *Polystichum phæolepis* HAYATA in sched. Herb. Taihoku. Rhizoma ascendens apice dense squamatum. Stipes 35 cm. longus basi dense squamatus sursum glaber, squamis pyramidalilanceolatis 10 mm. longis 3 mm. latis apice acuminatissimis basi latissimis truncatis castaneis. Frons in ambitu pentagona 30–40 cm. longa totiusque lata apice acuminata basi in ambitu cordata tripinnata, pinnis infimis bipinnatis, pinnis superioribus pinnatis vel pinnatifidis, pinnis breve petiolatis, pinnis superioribus lanceolatis, pinnis infimis oblique triangularibus 20 cm. longis 16 cm. latis latere inferiore basi 14 cm. latis latere superiore basi 3 cm. latis apice acuminatis basi obtusis, pinnulis infimis ordinis primarii (latere inferiore) multo longioribus lineari-lanceolatis 14 cm. longis 28 mm. latis apice acuminatissimis basi obtusis pinnatis (latere inferiore latioribus quam latere superiore), pinnulis ordinis secundarii inferioribus lineari-oblongis 2 cm. longis 7 mm. latis apice obtusissimis basi acutis plus minus adnatis sessilibus margine lobulatis,



Fig. 109, *Dryopteris phæolepis* HAYATA; a, the plant; b, a scale on the rhizome; c, a hair on the lower surface of the fronds; d, a pinnule; e, an indusium.



lobulis infimis 3 mm. longis  $2\frac{1}{2}$  mm. latis oblique oblongis apice 2-3 aristato-serris instructis. Frons a medio sursum sorifera; pinnæ inferiores a rhachibus frondium angulo  $50^\circ$  egressis, pinnis a se 7 cm. remotis, pinnulis ordinis primarii inferioribus a se  $2\frac{1}{2}$  cm. remotis, pinnulis ordinis secundarii inferioribus a se 8 mm. remotis; textura herbaceo-

coriacea tenuis, costis pinnulæ supra tenuiter

canaliculatis subtus elevatis, venis non visis; pagine supra glabra subtus pilis brevissimis parcissime oblecta. Sori utroque latere costæ pinnularum 1-seriatim dispositi.

HAB. Mt. Arisan: inter Funkiko et Taroyen, ad 6000 ped. alt., leg. B. HAYATA et S. SASAKI, 1912, Jan.

Somewhat near *Neph. recedens* (HOOK. Sp. Fil. t. 265); but differs from it by the scaly but not villose stipes and nearly glabrous fronds.

**Dryopteris** (*Meniscium*) **prolifera** C. CH. (Fig. 110) Ind. p. 286. *Polypodium proliferum* LOWE Ex. Fern. Vol. II. t. 18.

*Meniscium proliferum* = *Goniopteris proliferum*

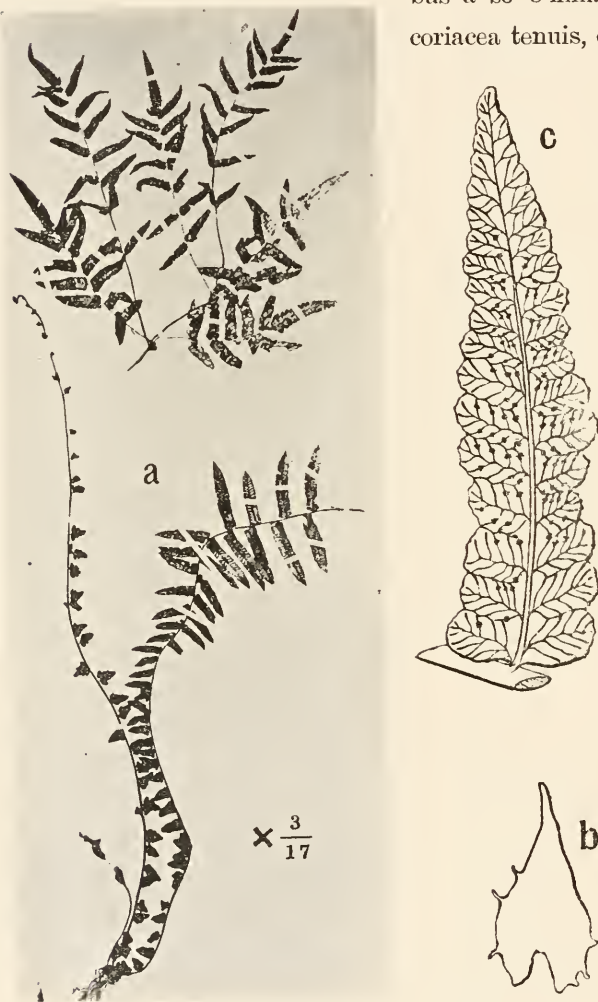


Fig. 11C, *Dryopteris* (*Meniscium*) *prolifera* C. CH.; a, the plant; b, a scale on the rhizome; c, a pinna.

(PRESL.) BEDD. Fern. South Ind. t. 172 et Handb. Fern. Brit. Ind. p. 296 fig. 153.



HAB. Satō, leg. H. INABA, Juli, 1911; Holisha, leg. T. SÔMA, 1911, Juli; Chikutōki, secus fossas crescens, leg. B. HAYATA et TAKEO ITÔ, Mart., 1914.

**Dryopteris** (*Eudryopteris*) **pseudosieboldii** HAYATA sp. nov. (Fig. 111).

Rhizoma? Stipes 35 cm. longus validus basi plus minus dilatatus minute muricato-punctatus basi dense squamatus sursum glabratus, squamis tenuibus lanceolatis ovatis usque 2 cm. longis 3-5 mm. latis apice filiforme acuminatis tenuissimis. Frons 40 cm. longa 30 cm. lata ovata apice in ambitu cuspidata basi in ambitu obtusa pinnata, pinnis totis æquiformibus æquilongis, pinna terminali lineari-lanceolata circ. 20 cm. longa 28 mm. lata apice acumi-

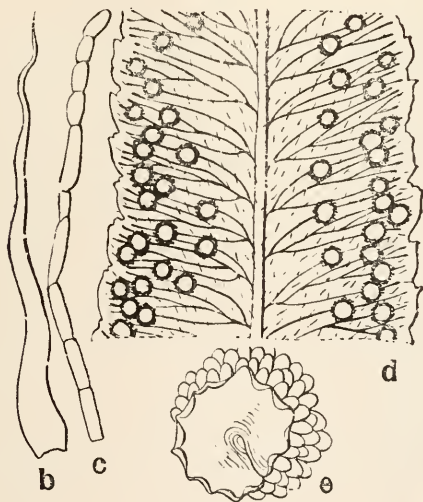


Fig. 111, *Dryopteris pseudosieboldii* HAYATA; a, the plant; b, a scale on the stipe; c, a hair on the lower surface of a pinna; d, portion of a pinna; e, a sorus.

nata (acumine lineari serrulato) basi obtusa margine tenuiter lobulata, lobulis inferioribus 3 mm. longis 6 mm. latis rotundatis subhorizontaliter sitis superioribus ad crenam reductis, sursum margine serrulato-denticulata, pinnis juxta terminalem paullo minoribus, pinnis inferioribus terminali æquilongis

margine crenulato-lobulatis, lobis minoribus serrulato-denticulatis, denticulis acutis; pinnis inferioribus a se 5 cm. remotis a rhachibus frondium angulo 60° egressis; pinnis lateralibus utroque latere rhachis 6 suboppositis, costis pinnarum supra leviter impressis subtus elevatis, venis lateralibus angulo 80° a costa egressis a basi ramosis a se 5 mm. remotis supra et subtus non elevatis tenuissimis distinctis; pagina coriacea supra glabra subtus plus minus pilis pluricellularibus parce dispersa a margine usque ad medium utrique lateris costæ sorifera supra viridissima subtus pallidior. Sori globosi 1½ mm. in diametro. Indusium cordatum margine undulatum sed integrum.

HAB. Arisan, leg. B. HAYATA et S. SASAKI, Jan., 1912.

Very near *D. Sieboldii*, but differs from it by the arrangement of sori which are scattered towards the margin, but not along the costa. It is still nearer to *D. podophylla* (Nat. Pfl.-fam. Pterid. p. 169 fig. 91, C et A), but distinguishable from it by the acutely serrulate margin of the fronds, by the subentire indusium and in the venation.

**Dryopteris** (*Eudryopteris*) **quadripinnata** HAYATA n. n. (Fig. 112). *Microlepia quadripinnata* HAYATA Mater. Fl. Formos. p. 434. Stipites 28 cm. longi basi pilosissimi (pilis crispatis depressis densis) etiamque basi squamati, squamis nigricantibus lanceolatis 4½ mm. longis 1½ mm. latis apice cuspidatis basi rotundatis extus glabris sub lente intus dense pilosis vel glabris, basi fuscentes a medio sursum stramineo-flavescentes subnitidi supra sulcati subteretes. Frondes late rhomboideo-triangulares 32 cm. longæ 40 cm. latæ apice acutæ vel acuminatæ basi acutæ vel obtusæ hirsutæ herbacæ, partibus infimis quadri-pinnatis, inferioribus tri-pinnatis, superioribus bi-pinnatis, sursum simpliciter pinnatis, pinnis utroque latere rhachis frondis circ. 18 plus minus alternis, inferioribus circ. 6-7 cm. a se remotis subrectis apice ascendento-recurvatis a rhachibus angulo 60° divaricatis, pinnis infimis late triangularibus oppositis 22 cm. longis 20 cm. latis latere inferiore latioribus 12 cm. latis petiolatis (petiolis 2-3 cm. longis), pinnulis I. utroque latere 16 inferioribus 4 cm. a se remotis, infimis elongato-triangularibus 13 cm. longis 6 cm. latis apice acuminatis petiolulatis (petiolulis 1 cm. longis) remote pinnatis; pinnulis II. utroque latere 15, inferioribus a se 1-2 cm. remotis, infimis longissimis triangulari-lanceolatis 4½ cm. longis 2 cm. latis remote pinnatis; pinnulis

III. utroque latere 6, inferioribus a se 7 mm. remotis oblique ovatis apice obtusis basi oblique cuneatis subsessilibus 1 cm. longis 8 mm. latis etiamque pinnatis vel pinnatifidis, segmentis inferioribus obliquis obovatis apice obtusis basi cuneato-attenuatis 4 mm. longis 2 mm. latis paucidentatis, (dentibus utroque latere 2-3), segmentis superioribus obovatis obliquis subunilateralibus dentatis vel integris; rhaches frondium complanatæ semi-teretes supra sulcatæ ad utrumque latus sulcorum dense hirsutæ cæterum glabræ subtus convexæ glabræ stramineæ; rhaches pinnarum supra leviter sulcatæ vel elevatæ sursum subalatæ supra dense hirsutæ subtus glabræ; rhaches pinnularum I. II. et III. complanatæ supra densissime hirtellæ subtus glabræ, venis et venulis utrinque hirsutis; paginæ secus venas et venulas utraque hirsutæ, venulis apice furcatis, ramis superioribus brevioribus apice soriferis, ramis inferioribus longioribus non soriferis, interdum venulis simplicibus soriferis vel sterilibus, ramis prope apicem evanescentibus. Sori sub quoque dente segmentorum vel venularum III. singuli ab apice dentum  $\frac{1}{3}$ -1 mm. remoti ad apicem ramorum venularum terminales. Indusium late cordatum  $\frac{1}{2}$  mm. latum margine ciliatum.

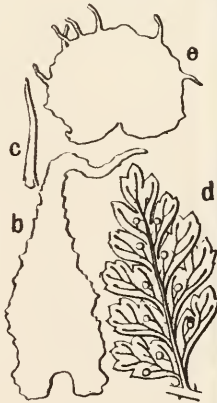


Fig. 112, *Dryopteris quadripinnata* HAYATA; b, a scale on the rhizome; c, unicellular hair on the upper side of a costa of a pinnule; d, a pinnule; e, an indusium.

HAB. Nantō: Mushazan, leg. T. KAWAKAMI et U. MORI, 1906, Aug. (No. 2390); Arisan, leg. B. HAYATA et S. SASAKI, Jan., 1912.

Very near *D. (Aspidium) Miqueliana* C. CH., but differs from it by the ciliate indusium.

***Dryopteris (Eudryopteris) reflexipinna* HAYATA sp. nov. (Fig. 113)**



Fig. 113, *Dryopteris reflexipinna* HAYATA; a, the plant; b, portion of a pinnule; c, a sorus.

Rhizoma? Stipes erectus 40 cm. longus glaber esquamatus stramineus rectus. Frons erecta triangularis 30 cm. longa latior quam longa circ. 40 cm. lata



apice in ambitu abrupte acuminata basi latissima quadripinnata, pinnis utroque latere 8-9, infimis longissimis superioribus gradatim brevioribus ad apicem ad dentem pinnæ terminalis reductis, inferioribus a se 5 cm. remotis, infimis 18 cm. longis triangularibus 10 cm. latis basi latere inferiore 7 cm. latis latere superiore 4 cm. latis apice acuminatissimis (acumine lineari) basi petiolatis (petiolis 2-3 cm. longis) pinnulis ordinis primarii infimis (latere inferiore) 8 cm. longis lanceolatis falcato-ascendenti-recurvis basi latissimis  $3\frac{1}{2}$  cm. latis apice acuminatissimis sub-æquilateralibus breve petiolulatis, pinnulis ordinis secundarii infimis (latere inferiore) oblique triangularibus 2 cm. longis  $1\frac{1}{2}$  cm. latis apice obtusissimis basi subtruncatis breve petiolulatis; pinnulis ordinis tertii infimis (latere inferiore) oblique obovatis  $1\frac{1}{2}$  cm. longis 4 mm. latis apice rotundato-obtusis basi cuneatis subsessilibus subunilateralibus 1-2-lobatis, lobis 2 mm. longis totiusque latis obtusissimis; pinnulis ordinis tertii infimis lateris superioris latioribus majoribus quam iis lateris inferioris. Rhachis frondis glaberrima valde flexuosa, rhachis pinnarum minus flexuosa sursum subalata complanata, rhachis pinnularum subrecta complanata subalata; pinnis inferioribus a se 6 cm. remotis, pinnulis ordinis primarii inferioribus a se 2 cm. remotis, pinnulis ordinis secundarii inferioribus a se 1 cm. remotis, pinnulis ordinis tertii inferioribus a se 5 cm. remotis, pinnis infimis a rhachibus frondium angulo  $140^{\circ}$ , pinnis superioribus angulo  $90^{\circ}$  divaricatis, pinnulis a rhachibus pinnarum angulo obtuso vel angulo recto divaricatis, pinnulis ordinis secundarii a rhachibus pinnularum ordinis primarii angulo  $70^{\circ}$  vel plus acuto divaricatis; frons textura tenuiter herbacea viridis, costis venis venulis supra obscure subtus distincte visis tenuissimis.

HAB. Rinkiho, leg. H. INABA, Oct. 1911; Mt. Arisan; Heishana, ad 7000 ped. alt., leg. B. HAYATA et TAKEO ITÔ, Mart., 1914.

When I first examined a herbarium specimen of this fern, I thought that it might have been a fern of scandent or pendulous habit, as the pinnæ and pinnule are always turning backwards and the rhachis is very flexuose. In my last excursion to the island, I found the fern, quite contrary to my expectation, standing erect or nearly so on the ground. It is very rare; I could find the fern but once in my journey through the mountains. Somewhat allied to *D. Maximowiczii* in its habit, sori and size, but greatly differs

from it by the reflexed pinnæ and quite obtuse apex of the lobes. Also resembles *Lastrea undulata* (THWAITES) (BEDD. Fern. South Ind. t. 271), but distinguishable from it by the less flexuose quite glabrous rhachis and stipes. The ramification of the fern is somewhat similar to that of *Gymnogramme anfractuosa* CHRIST (Farnkräuter der Erde p. 73, fig. 187).

**Dryopteris** (*Eudryopteris*) **reflexosquamata** HAYATA sp. nov. (Fig. 114). Rhizoma? Stipes 20–30 cm. longus dense squamatus, squamis reflexis lanceolato-ovatis 9 mm. longis  $2\frac{1}{2}$  mm. latis apice acuminatissimis margine remote brevissimeque setoso-ciliatis. Frons oblonga vel oblongo-lanceolata



Fig. 114, *Dryopteris reflexosquamata* HAYATA; a, the plant; b, a scale of the stipe; c, a pinnule.

35–40 cm. longa medio latissima 20 cm. lata apice triangulari-acuta vel breve cuspidata basi rotundata bipinnata vel bipinnatifida, pinnis inferioribus a se 4 cm. remotis angulo  $45^\circ$  a rhachibus divaricatis, pinnis mediis longissimis lanceolatis 12 cm. longis  $3\frac{1}{2}$  cm. latis apice cuspidato-acuminatis basi plus minus contractis pinnatis, pinnulis inferioribus a se 6 mm. remotis a rhachibus angulo  $80^\circ$ – $90^\circ$  divaricatis lineari-lanceolatis, mediis longissimis 18 mm. longis basi latissimis 5–6 mm. latis apice obtusis basi abrupte cuneatis sessilibus a se 7 mm. remotis margine duplicato-serrulatis, serrulis obtusis

1½ mm. longis totiusque latis apice et margine serrulis setosis 2-3 instructis. Textura tenuiter coriacea, rhachibus frondium rectis dense squamatis; costis pinnæ supra profunde sulcatis supra glabris subtus parce squamatis, squamis linearibus minutis, costulis et venis venulis supra impressis subtus ± elevatis; pagina supra glabra subtus minute parceque squamata. Sori utroque latere costæ 1-seriatim dispositi.

HAB. Arisan, ad 8000 ped. alt., leg. B. HAYATA et S. SASAKI, Jan. 1912.

Somewhat resembles *Neph. Falconeri* Hook. Sp. Fil. t. 256, but differs from it by the far less scaly fronds.

**Dryopteris** (*Phegopteris*) **remota** HAYATA (Fig. 115) Mater Fl. Formos. p. 421. Stipites tenues 18 cm. longi 1 mm. in diametro glabri nitentes subteretes supra profunde sulcati straminei. Frondes stipite breviores ambitu triangulares apice acuminatæ basi latissimæ 12 cm. longæ a basi 16 cm. latæ apice pinnatæ medio bipinnatæ infime tripinnatæ, pinnis remotissime oppositis, a rhachibus angulo 70° divaricatis, inferioribus 3 cm. a se remotis, infimis longissimis a basi sursum gradatim brevioribus; pinnis



FIG. 115, *Dryopteris remota* HAYATA; a, the plant; b, a scale on the rhizome; c, a pinnule.



infirmis elongato-triangularibus 8 cm. longis a basi  $3\frac{1}{2}$  cm. latis petiolatis (petiolis 13 mm. longis) obliquis latere inferiore quam latere superiore latioribus, pinnulis I. inferioribus pinnatis a se circ. 1 cm. remotis superioribus pinnatifidis versus summum lobulatis, pinnulis I. infimis latere inferiore pin-

narum 23 mm. longis 1 cm. latis sessilibus basi pinnatis medio pinnatifidis sursum lobulatis, (segmentis infimis angustato-quadrangularibus 6 mm. longis  $1\frac{1}{5}$  mm. latis apice obtusis basi plus minus contractis vel ad rhachin adnatis divaricatis margine undulato-integris, undis utroque latere 3-4). Rhaches frondium semiteretes glabræ tenuissimæ supra sulcatæ subtus convexæ; rhaches pinna- rum supra leviter sulcatæ glabræ; venis centralibus



Fig. 116, *Dryopteris serrato-dentata* HAYATA; a, the plant; b, a scale on the stipe; c, a portion of a pinna.



segmentorum infimorum et venulis flexuosis, venulis simplicibus ad sinus undarum attingentibus utrinque planis sed distinctis glabris; paginæ membranaceæ utraque glabræ. Sori globosi circ.  $\frac{3}{4}$  mm. in diametro ad quasque venulas dorsaliter siti utroque latere venarum 1-seriatim 3-4 dispositi; receptaculum prope apicem venularum lineare. Indusium non visum verisimiliter obsoletum.

HAB. In monte Morrison, leg. G. NAKAHARA, 1905, Oct.; Arisan, leg. B. HAYATA et S. SASAKI, Jan. 1912.

Near *Nephrodium Dryopteris*, but differs from it in the arrangement of the pinnæ.

**Dryopteris** (*Eudryopteris*) **serrato-dentata** (BEDD.) HAYATA n. n. (Fig. 116). *Dryopteris Filix mas* var. *serrato-dentata* BEDD.; HAYATA Mater. Fl. Formos. p. 416. *Lastrea odontoloma* MOORE BEDD. Handb, Fern. Brit. Ind. fig. 128.

HAB. In monte Morrison, ad 11000 ped. alt.

This is quite identical with the fern labelled as *D. Filix mas* var. *serrato-dentata* BEDD. in the herbarium at Kew. This fern is, however, so widely different from *D. Filix mas* in many points. It should better be regarded as specifically different from the type.

**Dryopteris** (*Leptogramma*) **squamæstipes** C. CH. (Fig. 117) Ind. p. 294. *Phegopteris auriculata* BEDD. Handb. Fer. Brit. Ind. p. 290 t. n. 149. *Polypodium auriculatum* (WALL.) BEDD. Fer. Brit. Ind. t. 203.

HAB. Arisan, leg. B. HAYATA et S. SASAKI, Jan., 1912.



Fig. 117, *Dryopteris* (*Leptogramma*) *squamæstipes* C. CH.; a, the plant; b, a scale on the stipe; c, a portion of a pinna; d, e, sporangia.

**Dryopteris** (*Cyclosorus*) **sophoroides** O. KTZE. form. **ensipinna**, (Fig. 118).

HAB. Botansha, leg. K. MIYAKE, Jan. 1900.

This looks different from *D. sophoroides*, but the venation, sori and



Fig. 118, *Dryopteris* (*Cyclosorus*) *sophoroides* O. Ktze.; a, the plant; b, a scale at the base of the stipe; d, an indusium.

scales are all very similar to those of the species, from which this may not be regarded as a distinct species nor even as a variety.

**Dryopteris** (*Eudryopteris*) **subdecipiens** HAYATA sp. nov. (Fig. 119).

Rhizoma suberectum apice dense squamatum, squamis ovato-lanceolatis nigris nitidis apice lineari-acuminatis plus 2 cm. longis 5 mm. latis. Stipes 30 cm. longus basi dense sursum parce squamatus, squamis inferioribus vel mediis linearibus 8 mm. longis basi 1 mm. latis subcordatis margine subintegris basi parce fimbriatis. Frons ovata 45 cm. longa 30 cm. lata apice cuspidata basi rotundata pinnata, pinnis mediis longissimis lineari-lanceolatis 15 cm. longis 3 cm. latis apice acuminatissimis basi late truncatis

sessilibus margine crenato-lobulatis sursum ad acumen serratis, lobulis rotundatis ascendentibus 5 mm. longis 7 mm. latis latere superiore 1-2-mucronatis, pinnis suboppositis a rhachibus angulo 80° divaricatis, inferioribus 3-4 cm. a se remotis versus apicem ± falcatis, costis supra impressis subtus

elevatis, venis lateralibus a se circ. 6 mm. remotis a costa angulo 50° egressis



Fig. 119, *Dryopteris subdecipiens* HAYATA; a, the plant; b, a scale on the apical portion of the stipe; c, d, scales on the frond rhachis; e, a hair on the costule of a pinna; f, basal portion of a pinna; g, apical portion of the same.



supra non visis subtus tenuiter visis distinctis a basi ramosis, ramis liberis. Textura herbaceo-membranacea. Sori secus costas multiserialiter dispositi prope marginem haud dispositi.



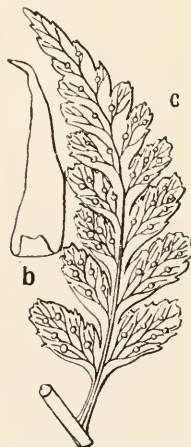
Fig. 120, *Dryopteris* (*Eudryopteris*) *subexaltata* C. CH. ; a, the plant ; b, a scale on the rhizome ; c, a pinna.

HAB. Arisan, leg. B. HAYATA et S. SASAKI, Jan., 1912.

Near *D. decipiens* O. KTZE. and *D. nigrisquama* HAY., but differs from them by the much larger fronds, acutely truncated base of the pinnae and by the scales on the rhachis which are long fimbriated at the base.

***Dryopteris* (*Eudryopteris*) *subexaltata* C. CH.** (Fig. 120) ; HAYATA Mater Fl. Formos. p. 418.

HAB. Liukiu : Nago-dake, April, 1907, leg. G. NAKAHARA.





**Dryopteris** (*Lastrea*) **sublaxa** HAYATA sp. nov. (Fig. 121). Rhizoma repens, radicibus filiformibus. Stipes parcissime squamatus 23 cm. longus stramineus glaber laevis, squamis lanceolatis 1–2 mm. longis. Frons lineari-lanceolata apice acuminata basi truncata 25 cm. longa 7 cm. lata pinnata, pinnis a rhachibus angulo 70°–90° divaricatis, inferioribus a se 1½ cm. remotis alternis, superioribus gradatim brevioribus, inferioribus lineari-lanceolatis 3½ cm. longis 1 cm. latis apice acuminatis ad summum obtusis basi latissimis truncatis sessilibus latere superiore latioribus quam latere inferiore, pinnatifidis vel pinnatilibus, lobis latere superiore infimis 6 mm. longis 2½ mm. latis lineari-oblongis apice obtusissimis, lobis superioribus gradatim minoribus ± acutis margine integris. Textura tenuiter membranaceo-herbacea, costa et vena pinnarum supra elevata densissime pilosa, pilis unicellularibus, subtus elevata subglabra pilis glanduliferis pluricellularibus brevissimis parce instructa; rhachibus brevissime villosis tenuissimis; pagina margine adpresse ciliata. Sori utroque latere costulæ loborum vel utroque latere costæ pinnarum 1–seriatim dispositi.

Indusium subcordatum margine integrum vel subcrenulatum.

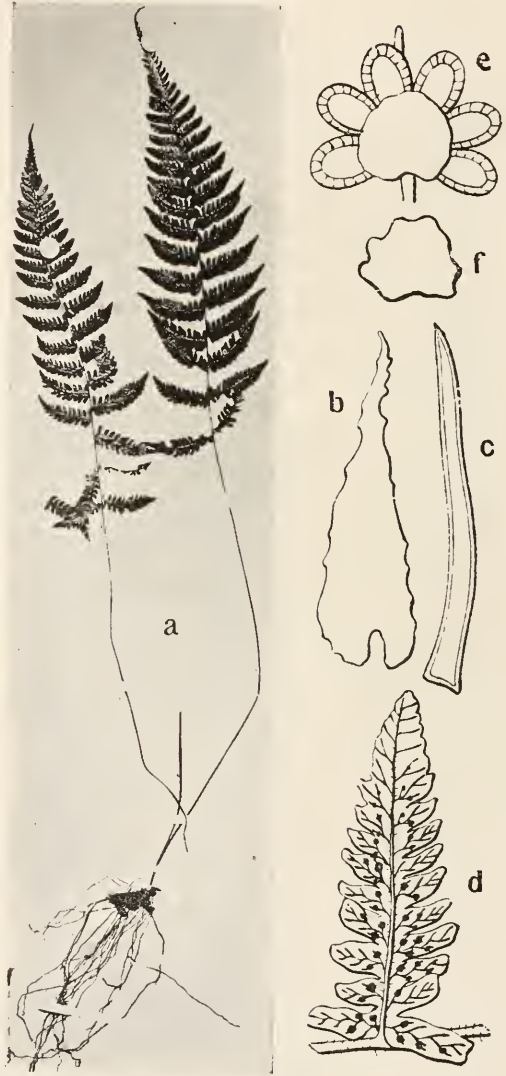


Fig. 121, *Dryopteris* (*Lastrea*) *sublaxa* HAYATA; a, the plant; b, a scale on the rhizome; c, a hair on the costule of a pinna; d, a pinna; e, a sorus; f, an indusium with more crenate margin.

HAB. Arisan, leg. B. HAYATA, 1912, Jan.

Near *D. laxa*, but differs from it by the not ciliate indusium and less hairy fronds.

***Dryopteris* (*Ctenitis*) *tenuifrons* HAYATA sp. nov. (Fig. 122). Rhizoma?**



Stipes 40 cm. longus, parce squamatus, squamis lanceolatis 4 mm. longis 1 mm. latis, sub lente pubescens. Frons longe triangularis 60 cm. longa 40 cm. lata apice triangulari-acuminata basi in ambitu obtriangulari-acuta inferiore bipinnata, pinnis inferioribus a se 8-10 cm. remotis a rhachibus  $70^{\circ}$ - $90^{\circ}$  divaricatis, pinnis infimis triangularibus 20 cm. longis basi totiusque latis apice triangulari-acutis breve petiolatis (petiolis 1 cm. longis) inaequalateralibus latere superiore 8 cm. latis, latere inferiore 14 cm. latis, pinnulis inferioribus a se 3 cm. remotis a costa pinnæ angulo  $80^{\circ}$ - $90^{\circ}$  divaricatis, pinnulis infimis (latere inferiore) longissimis superioribus gradatim brevioribus, infimis longissimis lineari-lanceolatis 14 cm. longis 3 cm. latis apice acuminatis basi truncatis latissimis breve petiolatis vel sessilibus pinnatifidis vel pinnatilobis, lobis lineari-oblongis 17 mm. longis 6 mm. latis apice obtusis

margine crenulatis, crenulis  $\pm$  ascendentibus; stipes, rhaches costaeque toto castaneo-rubescens; frons

Fig. 122, *Dryopteris tenuifrons* HAYATA; a, the plant; b, a scale on the stipe; c, a hair on the costa of a pinnule; d, a portion of a pinna.

textura tenuissime herbaceo-membranacea supra plus minus pubescens, pilis

pluricellularibus. Sori utroque latere costulae loborum prope marginem 1-seriatim dispositi.

HAB. Kōtōshō,  
leg, T. KAWAKAMI et  
S. SASAKI, Juli., 1912.

**Dryopteris** (*Eudryopteris*) **thrichorhachis** HAYATA sp. nov. (Fig. 123). Rhizoma? Stipes 70 cm. longus basi dense sursum parce squamatus castaneo-rubescens, squamis inferioribus latioribus lanceolatis 1-2 cm. longis 2-4 mm. latis apice subulato-acuminatis castaneo-nigricantibus validiusculis patentibus, squamis superioribus angustioribus linearibus vel setiformibus patentissimis; rhachis straminea squamis setiformibus ubique dispersa, squamis persistentibus patentissimis. Frons ovato-triangularis 66 cm. longa 50-55 cm. lata apice tenuissime



Fig. 123, *Dryopteris thrichorhachis* HAYATA; a, the type specimen; b, a younger specimen; c, a scale on the stipe; d, a hair on the upper side of a costa of a pinnule; e, a hair on the under side of a costa of the same pinnule; f, an upper pinnule from the younger specimen, seen from below; g, the same, seen from above; h, a second pinnule of the middle pinna; i, a sorus.



acuminata basi in ambitu obtusa tripinnata, pinnis inferioribus angulo  $45^{\circ}$  a rhachibus divaricatis a se 10–15 cm. remotis, infimis longissimis triangulari-lanceolatis 40 cm. longis 15 cm. latis apice tenuissime acuminatis (acuminibus linearibus serratis) latere superiore angustioribus latere inferiore latoribus, pinnulis infimis (latere superiore) lanceolatis 7 cm. longis 2 cm. latis, ab axillis rhachis frondis 2 cm. remotis, pinnulis infimis (latere inferiore) ab axillis 10 cm. remotis lanceolatis 12 cm. longis 3 cm. latis apice tenuissime



Fig. 124-A, *Dryopteris* (*Leptogramma*) *africana* C. CH.; a, the plant.

acuminatis basi truncatis, petiolulis 3 mm. longis, pinnulis ordinis secundarii infimis triangulari-oblongis 18 mm. longis 1 cm. latis apice obtusis basi subtruncatis sessilibus vel brevissime petiolulatis pinnatifidis, segmentis longe rectangularibus 8 mm. longis 2–3 mm. latis apice rotundatis margine integris vel obscure crenulatis, pinnulis inferioribus a se 3 cm. remotis, a rhachibus pinnarum angulo  $80^{\circ}$ – $90^{\circ}$  divaricatis. Textura rigide herbacea, pagina supra pauce ad costulas vel venulas pilis setiformibus dispersa, costulis supra canaliculatis subtus elevatis, subtus pilis minutis tenuissimis dispersis, venis venulis supra non visis subtus distincte visis leviter elevatis pilis minutis tenuissimis dispersis. Sori versus apicem pinnularum ordinis secundarii vel segmentorum pinnularum ordinis secundarii siti.

HAB. Arisan, leg. B. HAYATA et S. SASAKI, 1912, Jan.

Very near *Lastrea spectabilis* WALL. (BEDD. Handb. Fer. Brit. Ind. p. 257, fig. 132 = *D. Hendersoni* C. CH.). The smaller, perhaps younger form in the accompanying figures above given accords pretty well with



BEDDOME's figures, save the position of the sori which are in our specimens all located only towards the apex of the pinnules or of the segments of the latter. I am hesitating to regard this fern as distinct from *L. spectabilis*.

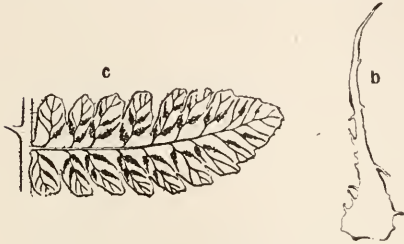


Fig. 124-B, *Dryopteris africana* C. a specimen so labelled in the Tōkyō herbarium. I am merely following C. CHRISTENSEN's Index in taking *D. africana* for this fern.

***Dryopteris* (*Eudryopteris*) *transmorrisonensis***  
HAYATA n. n. *Polystichum transmorrisonense* HAYATA  
Mater. Fl. Formos. p. 427.

HAB. In monte Morrison, ad 12000 ped. alt., leg. T. KAWAKAMI et U. Mori, Oct., 1906, (No. 2502).

***Dryopteris* (*Eudryopteris*) *Yabei* HAYATA** (Fig. 125), Mater. Fl. Formos. p. 424. Stipites rubescentes 30 cm. longi basi squamati (squamis linearibus nigricantibus 1-1½ cm. longis vel brevioribus rubescentibus) supra bisulcati basi 4 mm. lati ad totam longitudinem parcissime muricati. Frons in circumscriptione ovata 45 cm. longa 30 cm. lata apice cuspidata basi obtusa subglabra coriacea bipinnata, partibus infimis rarius subtripinnatis, pinnis mediis angus-

***Dryopteris* (*Leptogramma*) *africana***  
(DESV.) (Fig. 124, A-B.) C. CH. Ind. 251. *Nephrodium Totta* DIELS.

HAB. Arisan, leg. B. HAYATA et S. SASAKI, Jan., 1912.

Compared with

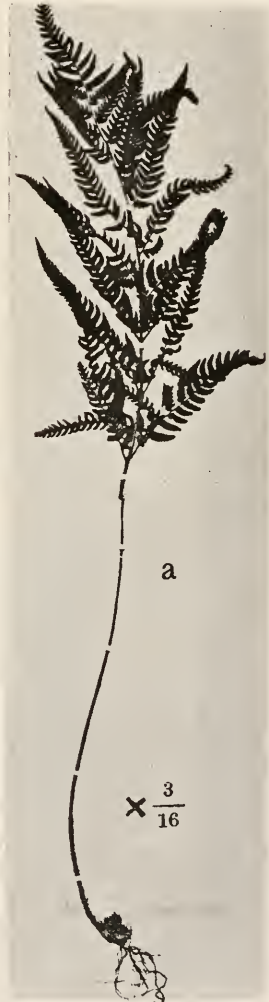


Fig. 125, *Dryopteris Yabei* HAYATA; a, the plant; b, a scale on the rhizome; c, a pinna; d, a sorus.

tato-lanceolatis 15 cm. longis basi latissimis 5 cm. latis apice acuminatis plus minus petiolatis, pinnis infimis conformibus longioribus latissimis, pinnis utroque latere rhachis frondis 15–16 inferioribus 5 cm. a se remotis, pinnis basi pinnatis sursum pinnatifidis, (segmentis falcato-recurvis apice acutis mediocribus 1½ cm. longis 4 mm. latis a basi contractis vel plus minus dilatatis margine obscure dentatis vel distincte dentatis); pagina supra viridis subtus pallidissime plus minus rubescens utraque glabra. Rhachis frondis supra bi-tri-sulcata piloso-squamata, squamis densiusculis rubris, subtus convexa minute parcissime muricata; rhachis pinnarum complanata supra plano-sulcata glabra subtus elevata squamata, venis et venulis liberis. Sori secus venas loborum pinnarum vel pinnularum sub quoque dente siti ab apice dentium 2 mm. remoti, vel sursum ad sinus dentium siti. Indusium persistens orbiculari-cordatum 1½ mm. in diametro rubrum margine paucissime eroso-ciliolatum.

HAB. Kussaku et Shintengai, leg. K. MIYAKE, 1899.

Near *Nephrodium acutum* HOOK., but differs from it by the shape of the lowest pinna.

**Dryopteris viridescens** (BAKER) O. KTZE.; C. CH. Ind. p. 300. *Nephrodium viridescens* BAKER Syn. p. 275.

HAB. Arisan, 7000–8000 ped. alt., leg. B. HAYATA et S. SASAKI, Jan., 1912.

Compared with a Japanese specimen so labelled in the herbarium at Tōkyō. This common Japanese fern is found in Formosa only in high elevations.

### *Aspidium* Sw.

**Aspidium submembranaceum** HAYATA sp. nov. (Fig. 126). Rhizoma? Stipes 30 cm. longus nitidus basi purpureo-nigrescens vel atro-castaneus sursum ± rubescens basi densissime squamatus, squamis linearibus rubro-castaneis usque 2 cm. longis 1 mm. latis margine remote ciliatis vel non ciliatis. Frons in ambitu ovato-cordata 30 cm. longa 18 cm. lata bipinnata apice acuta basi in ambitu cordata, pinnis oppositis a rhachibus frondis angulo 70°–80° divaricatis, inferioribus a se 5 cm. remotis, infimis triangularibus arcuatis inaequilateralibus 16 cm. longis 13 cm. latis, latere superiore basi 4 cm. latis, latere inferiore latioribus basi 9 cm. latis apice arcuato-acuminatis basi latis-

simis truncatis pinnatis pinnulis infimis latere superiore ab axillis 7 mm. distantibus 4 cm. longis, pinnulis infimis (latere inferiore) ab axillis 2 cm. remotis 10 cm. longis 3 cm. latis apice acuminatis lanceolatis basi truncatis sessilibus



Fig. 126, *Aspidium submembranaceum* HAYATA; a, a pinnule,  $\times 2$ .

usque ad  $\frac{2}{3}$  pinnatifidis, (rhachibus 6 mm. latis), segmentis rectangularibus apice obtusis 11 mm. longis 5 mm. latis margine denticulatis; venis anastomosantibus, areolis costalibus linearibus angustissimis; pagina membranacea in exsiccato rubescens utraque pilis minutis brevissimis parcissime dispersa, costulis venis venulisque supra elevatis distincte visis subtus subplanis; inter segmenta vel lobos pinnularum dentibus minutis  $\frac{1}{4}$  mm. longis sitis. Sori prope apicem vel prope marginem loborum vel segmentorum siti.

HAB. Urai, leg. B. HAYATA et S. SASAKI, Juli., 1912.

Very near *Dictyopteris chattagrammica*

BEDD. (*Aspidium membranifolium* KTZE.),

BEDD. Handb. Fern. Brit. Ind. p. 300, fig. 155.

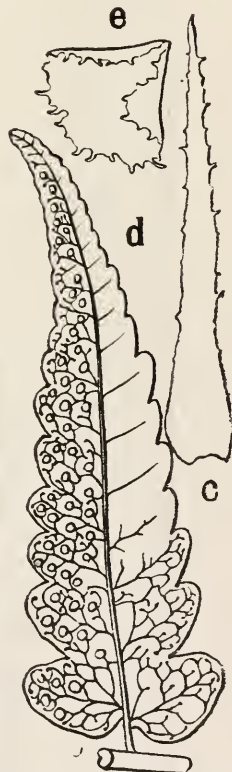
***Aspidium subtriphyllum* HOOK. form. *cuspidatopinnatum* (Fig. 127).**

HAB. Prope Botansha, leg. K. MIYAKE, Jan., 1900.

This fern is extremely variable. Our specimens here figured are so widely different from the type of



Fig. 127, *Aspidium subtriphyllum* HOOK. form. *cuspidatopinnatum*; a, the plant, sterile frond; b, the same, fertile frond; c, a scale on the stipe; d, a pinnule; e, an indusium.



*A. subtriphyllum* that it should otherwise claim to be a distinct species.

*Polystichum* ROTH.

*Polystichum aculeatum* ROTH.; HAYATA et MATSUM. Enum. Pl. Formos. p. 581.

HAB. Mt. Arisan, ad 7000 ped. alt., leg. B. HAYATA et S. SASAKI, 1912, Jan.

*Polystichum atroviridissimum* HAYATA sp. nov. (Fig. 128). Rhizoma erectum. Stipes 25 cm. longus basi spatulato-dilatatus squamatus, squamis

inferioribus linearibus superioribus ovatis paleaceis apice cuspidato-acuminatis basi rotundatis 7 mm. longis 3 mm. latis margine remotissime setulosis. Frons sterilis longe lineari-lanceolata 40–50 cm. longa 6–7 cm. lata medio latissima basi minus lata apice acuminatissima, acuminibus linearibus, pinnis mediis a se 13 mm. remotis longissimis sursum minoribus ad dentes 3 mm. longos reductis, pinnis fere horizontaliter patentibus, mediis  $3\frac{1}{2}$  cm. longis  $1\frac{1}{2}$  cm. latis oblique lanceolatis plus minus falcatis apice aristato-acutis basi oblique truncatis latere superiore latissimis basi auriculato-truncatis (auriculis 1 cm. longis cum rhachibus

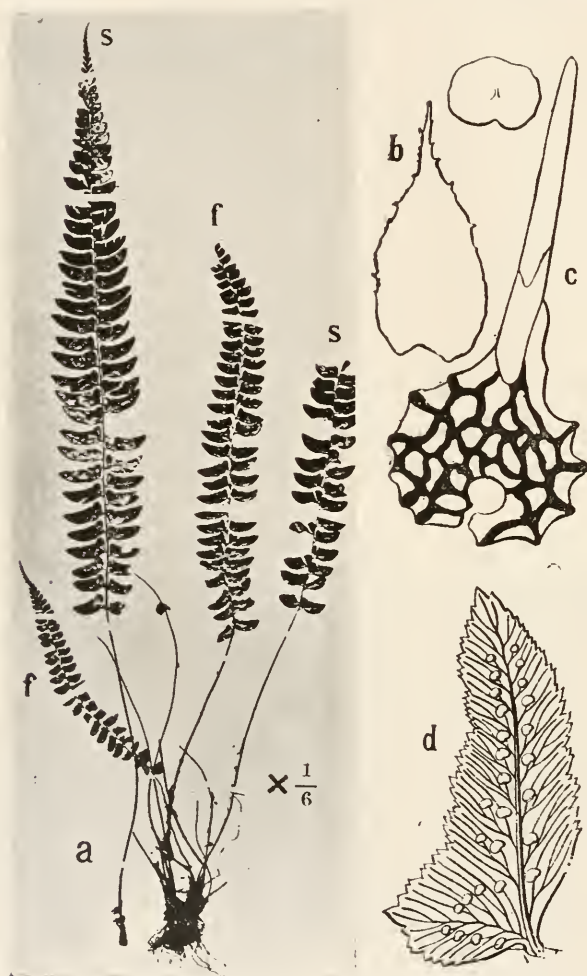


Fig. 128, *Polystichum atroviridissimum* HAYATA; a, the plant, s=sterile fronds, f=fertile fronds; b, a scale on the rhizome; c, a scale on the lower surface of a pinna; d, a pinna; e, a sorus.



parallelis), basi inferiore cuneato-acutis sessilibus vel brevissime petiolatis margine aristato-serrulatis; rhachis supra sulcata tenuis squamata, costis venis pinnae tenuissimis utraque pagine elevatis distinctis; pagina supra nitida atroviridissima glabra subtus regulariter secus venas venulas costulasque squamis minutis oblecta, squamis persistentibus subrubris  $\frac{1}{10}$  mm. latis cuspidato-rotundatis denticulatis basi cordatis; textura tenuiter coriacea. Frons fertilis quam sterili minora lanceolata 30 cm. longa 4-5 cm. lata subtus soris utroque latere costae fere uniseriatim dense instructa. Pinnæ steriles et fertiles margine tenuiter albo-marginatæ. Indusium peltatim rotundatum margine irregulariter crenato-integrum  $1\frac{1}{2}$  mm. in diametro.

HAB. In monte Arisan, ad 8000-7000 ped. alt., leg. B. HAYATA et S. SASAKI, 1912, Jan.

**Polystichum constantissimum** HAYATA sp. nov. (Fig. 129). *Dryopteris constantissima* HAYATA in sched. Herb. Taihoku. Rhizoma? Stipes 30 cm. longus fusco-stramineus basi squamatus, squamis nigricantibus, in magnitudine variabilibus majoribus lanceolatis linearibus vel ovatis acuminatissimis basi auriculato-cordatis vel truncatis 6-7 mm.



Fig. 129, *Polystichum constantissimum* HAYATA; a, the plant; b, a scale at the base of the stipe; c, one of the smallest scales on the stipe; d, a hair on the under surface of the frond; e, a pinna; f, an indusium.

longis, minoribus  $1\frac{1}{2}$  mm. longis. Frons in ambitu cordata apice acuminata basi cordata tripinnata 35 cm. longa 20–23 cm. lata, pinnis infimis longissimis 16 cm. longis breve petiolatis oblique cuspidato-triangularibus apice acuminatis basi oblique truncatis latissimis 13 cm. latis, (pinnulis infimis ordinis primarii latere inferiore longissimis 11 cm. longis, iis infimis latere superiore 3 cm. longis) pinnulis infimis ordinis primarii latere inferiore 11 cm. longis 3 cm. latis apice acuminatis basi plus minus rotundatis sessilibus, pinnulis infimis latere superiore 3 cm. longis triangulari-ovatis apice obtusis basi truncato-cuneatis sessilibus, pinnulis infimis ordinis secundarii triangulari-oblongis sessilibus margine lobulatis, lobis ascendento-patentibus infimis oblongis 4 mm. longis  $2\frac{1}{2}$ –3 mm. latis margine remote aristato-serrulatis; pagina subtus toto (exceptis pinnulis inferioribus pinnarum infimarum) sorifera;

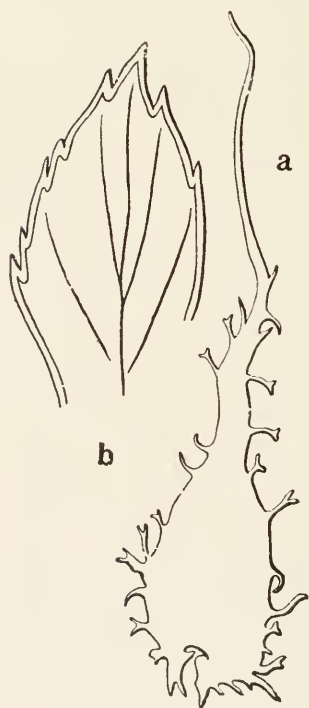


Fig. 130, *Polystichum falcatipinnum* HAYATA; a, one of the smallest scales on the stipes; b, a portion of a pinna.

rhachis frondis et pinnarum supra profunde sulcata superiore anguste canaliculata squamata, costulis pinnularum supra canaliculatis subtus elevatis, venis lateralibus supra non visis subtus plus minus visis; pagina coriacea margine aristata supra glabra subtus minute pilosa, pilis minute  $\frac{1}{2}$  mm. longis, squamis ad rhachin pinnarum vel pinnularum basi sacciferis.

HAB. Monte Arisan, leg. B. HAYATA et S. SASAKI, 1912, Jan.

Near *P. varium* Pr.; but differs from it by the very much unequal sided lowest pinnæ with the longer lowest pinnules on the lower side, which pinnules are as twice long as the next pinnules.

***Polystichum falcatipinnum* HAYATA sp. nov.** (Fig. 130). Rhizoma erecto-ascendens cum reliquis stipitum 5 cm. in diametro. Stipes 20 cm. longus frondibus brevior, squamis variabilibus linearibus vel lanceolatis latioribus vel angustioribus, majoribus  $1\frac{1}{2}$  cm. longis 4–5 mm. latis apice cuspidatis, minoribus lanceolatis cus-

pidatis 2 mm. longis  $\frac{1}{2}$  mm. latis margine ciliatis. Frons lanceolata 40-60 cm. longa 10 cm. lata apice acuminatissima medio latissima basi minus lata 6 cm. lata pinnata, pinnis mediis longissimis deorsum paullo brevioribus sursum gradatim brevioribus in acumine ad dentem reductis, pinnis mediis longissimis 6 cm. longis 2 cm. latis lanceolatis apice aristato-acuminatis basi latissimis brevissime petiolatis (petiolis 2 mm. longis) pinnatifidis, basi latere superiore latioribus auriculato-truncatis, basi latere inferiore cuneato-acutis, deorsum pinnatifidis, pinnulis latere superiore basilaribus auriculiformibus 13 mm. longis 6-7 mm. latis oblique ovatis apice in ambitu obtusis margine aristato-serrulatis sed latere inferiore integris, pinnulis vel lobis juxta lobum infimum valde minoribus sursum ad dentem reductis (dentibus aristatis), margine tenuiter cartilagineo-albo-marginatis. Sori utroque latere costæ 1-seriatim dispositi; rhachis frondis squamata, squamis linearibus; costæ pinnæ supra canaliculata subtus leviter elevata, venis supra non visis subtus tenuiter distinctis; pagina coriacea supra nitida viridissima subtus glauca supra parce squamis minutis dispersa, subtus secus venas venulas regulariter squamata, squamis minutis cuspidato-ovatis  $\frac{1}{10}$  mm. latis.

HAB. Arisan, ad 7-8000 ped. alt., leg. B. HAYATA et S. SASAKI, 1912, Jan.

**Polystichum globisorum** HAYATA sp. nov. (Fig. 131). Rhizoma erecto-ascendens, apice cum reliquis stipitum 3 cm. in diametro. Stipes 50 cm. longus basi densissime squamatus, squamis fulvo-castaneis longe filiformi-linearibus 1 cm. vel plus longis  $1-\frac{1}{2}$  mm. latis apice filiformibus basi oblique cordatis vel truncatis margine remote obscure setulosis vel subintegris, superiore subglabratus cum rhachibus stramineo-rubescens. Frons in ambitu cordato-pentagona 50 cm. longa 43 cm. lata apice ambitu triangulari-acuta subito-acuminata basi ambitu cordata quadripinnatifida, pinnis infimis longissimis tripinnatifidis 30 cm. longis 23 cm. latis subtriangularibus basi latissimis, apice acuminatis (petiolis 2 cm. longis), pinnulis infimis latere inferiore longissimis ea altera multo longioribus 18 cm. longis 6-7 cm. latis pyramidalilanceolatis apice acuminatis (acuminibus linearibus serrulatis) basi latissimis (petiolulis 1 cm. longis), pinnulis ordinis secundarii infimis (latere inferiore) longissimis triangulari-oblongis  $4\frac{1}{2}$  cm. longis  $1\frac{1}{2}$  cm. latis apice acutis basi obliquis (petiolulis 2-3 mm. longis) pinnatifidis, segmentis infimis (latere su-



periore) longissimis rhomboideo-ovatis  $1\frac{1}{2}$  cm. longis 7 mm. latis apice aristato-acutis basi oblique cuneatis margine serratis vel duplicato-serratis, serris apice aristatis tenuiter cartilagineo-marginatis, segmentis pinnularum ordinis secundarii sursum ad dentem reductis; pinnis inferioribus a se

10–5 cm. remotis, superioribus gradatim reductis, pinnulis ordinis primarii pinnæ infimæ a se 4 cm. remotis, pinnulis ordinis secundarii inferioribus a se 2 cm. remotis; pagina supra nitida viridissima glabra subtus glabrata vel paucissime squamata, squamis minutis linearibus; textura tenuiter coriacea; pinnis a rhachibus frondis, pinnulis a rhachibus pinnæ angulo  $45^\circ$  divaricatis, sed pinnulis infimis a rhachibus pinnæ angulo recto divaricatis; rhaches frondes et pinnæ supra profunde sulcatæ sursum canaliculatæ, latere canaliculorum costulato-elevatæ, costulis



Fig. 131, *Polystichum globisorum* HAYATA; a, the plant; b, a scale on the rhizome; c, a pinnule; d, margin of the same; e, an indusium.



pinnularum ordinis secundarii supra canaliculatis, venis lateralibus supra impressis vel non visis infra plus minus distinctis. Sori ad totam paginam (exceptis apicibus pinnae et pinnulae) utroque latere costulae 1-seriatim dispositi globoso-cordati  $1\frac{1}{2}$  mm. in diametro globoso-elevati. Indusium rotundato-cordatum margine denticulatum.

HAB. Arisan, ad 7000–8000 ped. alt., leg. B. HAYATA et S. SASAKI, 1912, Jan.

Near *P. laserpiliifolium*, but differs from it by the far much larger fronds with reflexed basal pinnules.

**Polystichum horridipinnum** HAYATA sp. nov. (Fig. 132). Rhizoma erectum vel ascendens cum reliquis stipitem 3 cm. in diametro sectionis apice frondes caespitosim gerens. Stipes 4 cm. longus dense squamatus, squamis in magnitudine variabilibus 3 mm.–10 mm. longis cuspidato-ovatis usque ad lanceolatis apice acuminatis crispato-recurvis basi ad insertionem minute cordatis minute auriculatis vel haud auriculatis tenuissimis membranaceis mar-

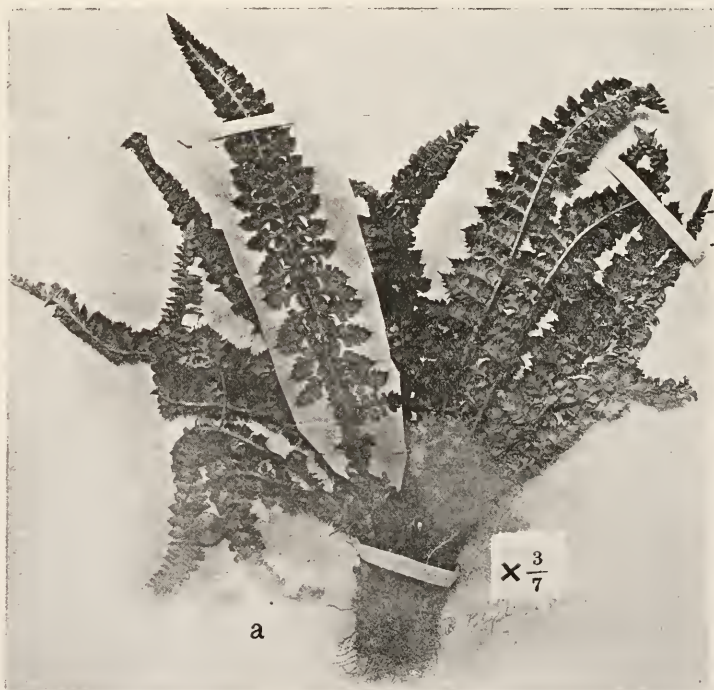


Fig. 132, *Polystichum horridipinnum* HAYATA; a, the plant; b, a pinna; c, d, f, various kinds of scales on the rhizome, stipe or rachis; e, scales on the lower surface of the frond.

gine irregulariter ciliato-serrulatis vel denticulatis. Frons lanceolata 15 cm. longa 3 cm. lata apice aristato-acuminata basi latissima truncata pinnata, pinnis infimis longissimis superioribus gradatim minoribus, inferioribus a se ad insertionem 1 cm. remotis vix vel haud imbricatis pinnatifidis, infimis triangulari-oblongis vel lanceolatis 2 cm. longis 12 mm. latis apice aristato-acutis basi truncatis latissimis sessilibus pinnatifidis obliquis latere superiore latioribus, segmentis infimis oblique rotundato-ovatis apice aristato-triangulari-acutis basi cuneatis margine 1-2 dentibus aristatis instructis, aristis validis  $1\frac{1}{2}$  mm. longis. Textura valde crasso-coriacea, pagina supra nitida glabra viridissima subtus pallida parce squamata, squamis interdum piliformibus crispatis. Rhachis frondis supra latiuscule sulcata, inferiore subtus  $\pm$  squamata, superiore glabra supra toto glabra, costis et venis pinnarum supra impressis subtus subimpressis distincte visis. Frons a medio usque ad apicem sorifera.

HAB. Montibus centralibus, leg. U. MORI, 1909, Dec.

Near *Aspidium Lonchitis* (LOWE Brit. Exot. Fern, VI. t. 22) in the outline and size of the fronds; still nearer *Polystichum ilicifolium* DON (BEDD. Fern. Brit. Ind. p. 206, fig. n. 103). The latter may be proved to be identical with our fern, when close examination will be made with herbarium-materials.

**Polystichum integripinnum** HAYATA sp. nov. (Fig. 133) = *Aspidium integripinnum* HAYATA. Rhizoma? Stipes? Frons pyramidali-lanceolata 73 cm. longa infra medium latissima 30 cm. lata basi minus lata 25 cm. lata superiore angustior apice subito acuminata (acumine lineari) simpliciter pinnata, pinnis inferioribus longissimis 7 cm. a se remotis angulo  $45^\circ$  divaricatis lineari-lanceolatis circ. 20 cm. longis 24 mm. latis apice acuminatis basi  $\pm$  latioribus subito acutis sessilibus obliquis latere superiore latioribus basi leviter auriculiforme dilatatis margine integris vel obscure undulatis sursum serrulatis rectis, pinnis superioribus gradatim minoribus versus summum ad dentem abeuntibus  $\pm$  falcatis. Rhachis frondis recta squamata, squamis oblongo-lanceolatis lanceolatis 2-6 mm. longis apice cuspidatis acuminatis basi profunde cordatis (lobis cordis imbricatis) margine fimbriato-ciliolatis, costa pinnæ supra tenuiter impressa subtus elevata, venis lateralibus utraque pagine non visis vel subtus vix visis, venis lateralibus a costa  $45^\circ$  divaricatis 4-5 mm. a se remotis ramosis versus marginem anastomosantibus areolas formantibus, areolis cum

venulis liberis; pagina frondis supra glabra subtus ad costam et ad paginam squamata, squamis costæ ea rhachis subsimilibus, squamis paginæ amœboi-

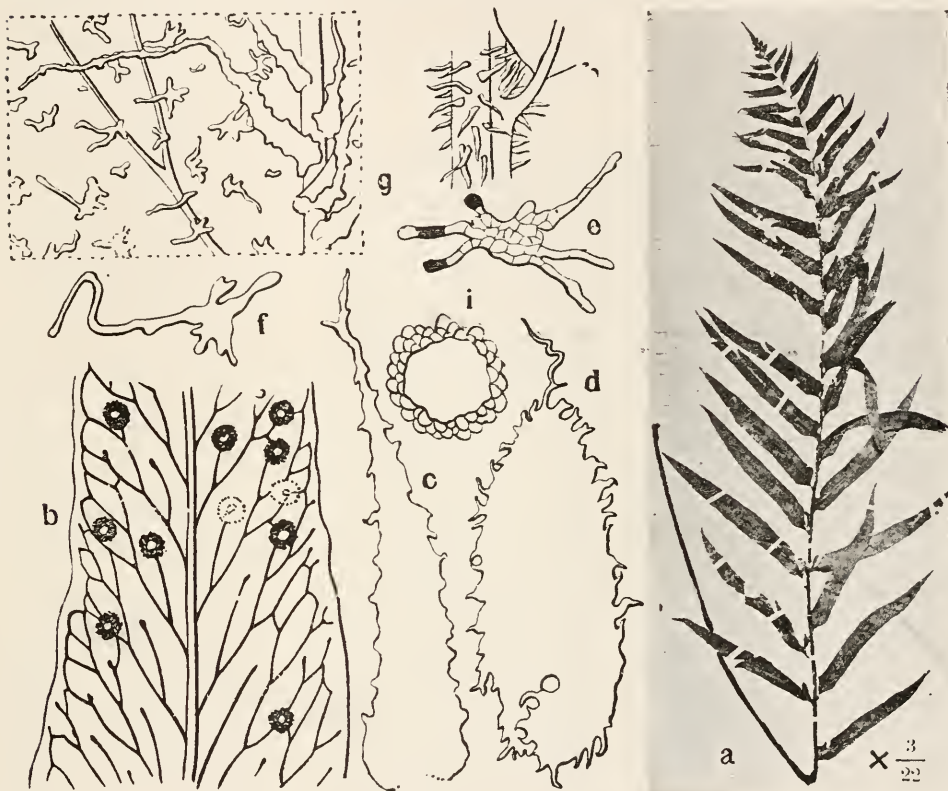


Fig. 133, *Polystichum integripinnam* HAYATA; a, the plant; b, a portion of a pinna; c, a scale on the stipe; d, a scale on the rhachis of the frond; e, f, scales on the under surface of a pinna; g, a portion of the under surface of a pinna; h, a portion of the rhachis; i, a sorus.

deis multiradiatis in forma variabilissimis. Textura herbaceo-coriacea. Sori a medio sursum frondis irregulariter dispositi.

HAB. Arisan, leg. B. HAYATA et S. SASAKI, Jan., 1912.

Most near *Aspidium caducum* WALL. (HOOK. et GREV. Ic. Fil. t. 171); but differs from it by the much longer fronds with nearly entire narrower pinnæ. The fern is as well referable to *Aspidium* as to *Polystichum*. Also somewhat resembles *Polystichum lonchitoides* (CHRIST) DIELS (Herb. Corea. tested by Dr. T. NAKAI), but differs from it by the not auricled pinnæ with entire margin.

***Polystichum prionolepis* HAYATA sp. nov.** (Fig. 134). Rhizoma erecto-



ascendens. Stipes 20 cm. longus frondem æquans basi densissime squamatus superiore minus dense squamatus, squamis castaneis dimorphis, squamis basis stipitum linearibus vel filiformi-linearibus circ. 12 mm. longis acuminatis  $\frac{1}{2}$ –1 mm. latis, squamis in medio stipitum latioribus lanceolatis ovatis 12–15 mm. longis 2–3–4 mm. latis apice cuspidatis (cuspidibus



Fig. 134, *Polystichum prionolepis* HAYATA; a, the plant; b, a scale on the stipe; c, the margin of the same; d, a scale on the rachis; e, margin of the same; f, a scale on the lower surface of a pinna; g, a pinna.



filiformibus), generaliter squamis linearibus et ovatis intermixtis. Frons lanceolato-triangularis vel lanceolata in longitudine stipitem æquans 15–18 cm. longa 7–8 cm. lata apice acuminata basi latissima truncata pinnata, pinnis utroque latere circ. 16 a rhachibus frondis angulo recto divaricatis, pinnis infimis plus minus retrorsum reflexis longissimis 4 cm. longis 1 cm. latis a se  $1\frac{1}{2}$  cm. remotis oblique lanceolatis sessilibus apice aristato-acutis basi obliquis latere superiore recto-auriculatis, (auriculis vel dentibus infimis 8 mm. longis 7 mm. latis) latere inferiore cuneato-acutis margine grosse serrato-dentatis, dentibus subrotundatis aristato-apiculatis margine serrulatis superioribus gradatim minoribus ad serrulam simplicem reductis, pinnis superioribus gradatim minoribus sursum ad dentes reductis; rhachis frondis squamata, squamis linearibus castaneis; pagina frondis valde coriacea supra nitida glabra ad costam impressa minute fugacio-hirtellata subtus plus minus glauca minute paucisque squamifera. Sori utroque latere costæ 1- vel 2-seriatim dispositi.

HAB. Arisan, ad 8000 ped. alt., leg. B. HAYATA et S. SASAKI, Jan., 1912.

Semewhat near *P. cæspitosum* WALL. (HOOK. Sp. Fil. t. 213).

**Polystichum rectipinnum** HAYATA sp. nov. (Fig. 135). Rhizoma? Stipes 25–30 cm. longus toto densiuscule squamatus, squamis in forma variabilibus linearibus vel lanceolatis ovatis margine ciliato-denticulatis apice cuspidatis, iis ovatis 1 cm. longis 3 mm. latis castaneis. Frons sterilis lanceolato-triangularis vel lanceolata 35 cm. longa 15 cm. lata apice acuta basi subtruncata pinnata, pinnis inferioribus longissimis 8–9 cm. longis lanceolatis 8–9 cm. longis  $2\frac{1}{2}$  cm. latis sessilibus apice acuminatis basi oblique truncatis pinnatifidis vel inferiore pinnatis, pinnulis vel segmentis vel lobis infimis (latere superiore) maximis 10–12 mm. longis quadrangularibus 6 mm. latis valde obliquis latere superiore latioribus apice apiculato-aristato-acutis margine obscure crenatis vel subintegris, lobis superioribus minoribus brevioribus sursum ad dentem reductis, dentibus ascendentibus aristato-apiculatis; pinnis infimis retrorsum reflexis, mediis horizontaliter patentibus sursum plus minus descendentibus gradatim minoribus ad dentem reductis, inferioribus 1–2 cm. a se remotis subalternis; rhachis frondis supra sulcata squamata, squamis linearibus; costa pinnarum supra sulcata subtus elevata, venis

lateralibus supra non visis subtus plus minus elevatis distinctis; pagina coriacea. Frons fertilis quam eis sterilibus multo angustior lanceolato-pyramidalis quam stipite in longitudine brevior 25 cm. longa basi latissima 13 cm. lata pinnata, pinnis totis horizontaliter patentibus vel plus minus retrorsum reflexis, inferioribus 3 cm. a se remotis, superioribus minoribus sursum ad dentem reductis, infimis longissimis lanceolatis 6-7 cm. longis 23 mm. latis apice

acuminatis basi oblique truncatis sessilibus pinnatis vel pinnatifidis, pinnulis infimis latere superioribus longissimis cum rhachibus frondium parallelis oblongo-lanceolatis 12 mm. longis 4-5 mm. latis apice aristato-apiculatis basi oblique auriculato-truncatis latere superiore valde latioribus margine obscure denticulatis vel subintegris. Pagina supra viridissima plus minus squamis linearibus instructa, subtus dense sorifera squamata. Sori utroque latere costulae pinnularum uni-seriatim a basi frondis usque ad apicem dense dispositi.

HAB. Arisan, ad 7000-8000 ped. alt., leg. B. HAYATA et S. SASAKI, Jan., 1912.

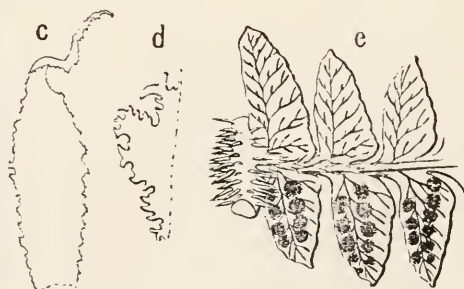


Fig. 135, *Polystichum rectipinnum* HAYATA; a, a sterile frond; b, fertile fronds; c, a scale of the stipe; d, margin of the same; e, a portion of a pinna.

**Polystichum Tsus-Simene** J. SM. Compared with a Japanese specimen in the Tōkyō herbarium.

HAB. Arisan : prope Senninbora, leg. B. HAYATA et T. ITŌ, Mart., 1914.

*Gymnopteris* BERNH.

**Gymnopteris dichotomophlebia** HAYATA sp. nov. (Fig. 136). Rhizoma repens 2–3 mm. in diametro squamis dense obtectum, squamis cordato-ovatis apice obtusis vel acutis 2–3 mm. longis basi alte cordatis (lobis cordis profunde imbricatis) apice obtusis vel acuminatis. Stipes cum rhizomate continuus haud articulatus. Frons sterilis cum stipitibus lanceolata vel elliptico-lanceolata 20–25 cm. longa 3–3½ cm. lata apice triangulari-obtusa basi gradatim angustata attenuata ad stipitem brevissimum 3–4 mm. longum abeuns

margine integra membranacea in exsiccato pellucida distincte venosa, costis tenuibus utraque pagine distincte elevatis, venis lateralibus plerumque dichotome ramosis reticulato-anastomosantibus (areolis costalibus subtriangularibus 7–8 mm. longis venulam liberam singulam furcato-ramosam includentibus), venis venulisque utraque pagine distincte elevatis tenuibus; pagina membranaceo-chartacea margine integra vel sensim repanda. Frons fertilis longe stipitata, stipitibus tenuibus fronde æquilongis 27 cm. longis

glabris subcomplanatis 1½ mm. in diametro. Lamina angustissime linearis stipitem æquans vel brevior 23 cm. longa 3–3½ mm. lata apice acuminata basi gradatim attenuata ad stipitem abeuns supra glabra, costa elevata, margine integra leviter desuper recurva subtus toto sorifera; paraphyses lineares apice plus minus clavatae.

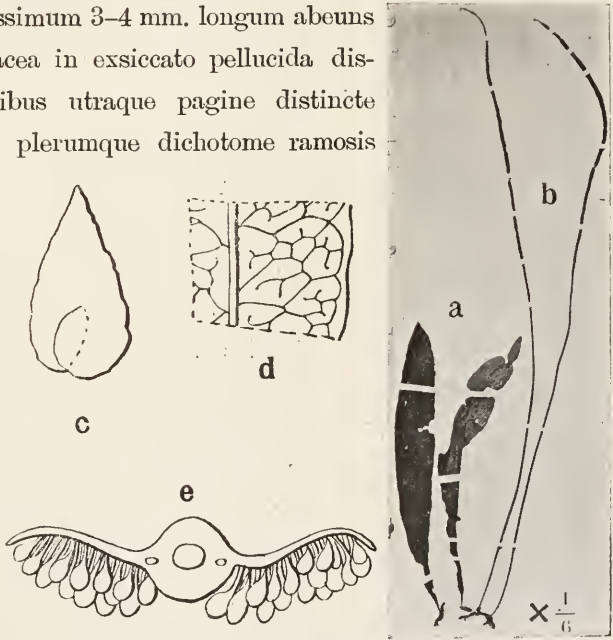


Fig. 136, *Gymnopteris dichotomophlebia* HAYATA; a, sterile fronds of the plant; b, fertile fronds; c, a scale on the rhizome; d, portion of a sterile frond; e, cross section of a fertile frond.

HAB. Hainan, leg. Z. KATSUMADA, 1911.

*Leptochilus dichotomophlebia* HAYATA in sched. herb. Taihoku.

Near *Gymnopteris variabilis* (BEDD. Fern. Brit. Ind. t. 272 and Handb. Fern. Brit. Ind. p. 429, fig. 258), but differs from that by the lanceolate sterile fronds which are in our species much obtuse at the apex and are gradually attenuated towards the base, and by the very short stipes; also near *Gymnopteris Feei* MOORE (BEDD. Fern. South Ind. t. 48), but differs from it by the linear fertile fronds. Lateral veins in our fern are nearly feathery towards the apex, but usually dichotomously branched downwards. Whether the stipes are articulated to the rhizomes or not is very questionable. There are seen faint lines, in which they are articulated, at the very base of the stipes. The lines, however, are not clear so as to decide the existence of articulation by themselves.

*Nephrolepis* SCHOTT.

***Nephrolepis tenuissimum*** HAYATA sp. nov. (Fig. 137). Rhizoma ascendens vel subrepens densiuscule foliosum, cum reliquis stipitum  $1\frac{1}{2}$  cm. in diametro. Stipes basi dilatatus nigricans supra basin sursum castaneo-stramineus basi densiuscule squamatus sursum gradatim glabratus, (squamis nigro-castaneis triangulari-lanceolatis basi plus minus rotundatis margine integris vel obscure remote dentiusculis apice acuminatis usque 3-4 mm. longis  $1-\frac{1}{2}$  mm. latis) usque 10 cm. longus gracillimus erectus supra profunde sulcatus plus minus minute pilosus vel subglabratus. Frons lanceolata usque 20 cm. longa 5 cm. lata apice tenuissime attenuato-acuminata (acuminibus linearibus) basi leviter angustior simpliciter pinnata, pinnis mediis horizontaliter patentibus longissimis a se 1 cm. remotis 22 mm. longis 6 mm. latis oblique oblongo-linearibus apice obtusis basi latere superiore auriculato-productis (auricula triangulari-oblonga latere interiore 8 mm. longa latere exteriori 4 mm. longa apice rotundata basi latissima 4 mm. lata margine obscure denticulata) basi latere inferiore cuneato-acutis breve petiolatis (petiolo 1 mm. longo) margine obtuse remoteque obscure serrulatis, pinnis inferioribus plus minus reflexis plus minus gradatim brevioribus, infimis 18 mm. longis, superioribus gradatim brevioribus plus minus ascendentibus versus summum ad dentes 3 mm. longos abeuntibus; rhachis frondis glanduloso-hirsuta, pilis uni-



cellularibus brevissimis apice plus minus clavatis, supra canaliculata, petiolis pinnarum supra canaliculatis cum rhachibus frondium articulatis; textura membranacea ad marginem valde tenuissima, costis venis venulis utraque pagine planis subtus leviter elevatis distincte visis parce pilis glandularibus uni-



Fig. 137, *Nephrolepis tenuissima* HAYATA; a, the plant; f, a scale on the rhizome; c, a part of a rhachis with a petiole; d, a glandular hair on the same; e, a pinna; b, a sorus; g, an indusium.

cellularibus instructis; pagina supra fusco-viridis subtus pallidior. Sori medio inter costam et marginem utroque latere costæ pinnæ vel costulæ auriculæ pinnæ 1-seriatim dispositi rotundati. Indusium rotundatum ad basin adnatum margine eroso-denticulatum  $1\frac{1}{2}$  mm. latum latius quam longius.

HAB. Arisan, ad 8000-7000 ped. alt., leg. B. HAYATA et S. SASAKI, Jan. 1912.

General aspect of this new species is just the same as that of *Dryopteris*. But the relationship of this fern and *Arthropteris ramosa* is very close in the venation, sori and especially in the glandular hairs on the rhachis. Our fern differs from that genus only in having unarticulated fronds. So far as I am aware, this is the most tiny form of all the known species of *Nephrolepis*.

*Davallia* Sm.

***Davallia stenolepis* HAYATA sp. nov.** (Fig. 138). Rhizoma repens



crassiusculum tereti-subcomplanatum 4-5 mm. in diametro squamis dense obtectum, squamis lineari-ovatis basi ad apicem 1 cm. longis basi peltatis (partibus peltatis ovatis 2 mm. longis  $1\frac{1}{2}$  mm. latis) medio linearibus  $\frac{1}{3}$  mm. latis apice filiformibus margine remote serrulatis. Stipes subteres 20 cm. longus basi plus minus squamatus supra basin

Fig. 138, *Davallia stenolepis* HAYATA; a, the plant; b, a scale on the rhizome; c, margin of the same; d, a pinnule; e, a portion of the same; f, a sorus.

toto glaber. Frons triangulari-rhomboidea 30-40 cm. longa totiusque lata quadripinnatifida vel tripinnata (pinnis ordinis tertii pinnatifidis) apice triangulari-acuta, pinnis inferioribus a se 5-6 cm. remotis a costa angulo  $60^{\circ}$  divaricatis; pinna infima 20 cm. longa oblique triangulari 14 cm. lata apice acuminatissima breve petiolata, pinnulis I. infimis triangulari-lanceolatis 8 cm. longis 4-5 cm. latis a se 3 cm. remotis breve petiolulatis, pinnulis II. oblongis  $2\frac{1}{2}$  cm. longis brevissime petiolulatis pinnatifidis, segmentis infimis 8 mm. longis inciso-lobatis, lobis oblongis 1-2 mm. longis apice obtusis vel acutis; rhachis pinnae tenuiter alata; textura herbaceo-membranacea utraque pagine glabra.

HAB. Taitō: Daironkōsha, leg. U. MORI, 1908, Nov. (No. 2359); Musha (No. 2408); Arisan, leg. B. HAYATA et S. SASAKI, 1912, Jan.

Near *D. bullata* WALL., but differs from it by the thinner texture and by the shape of the sorus-bearing lobes.

*Leucostegia* PRESL.

*Leucostegia parvipinnula* HAYATA n. n. (Fig. 139). *Davallia parvi-*

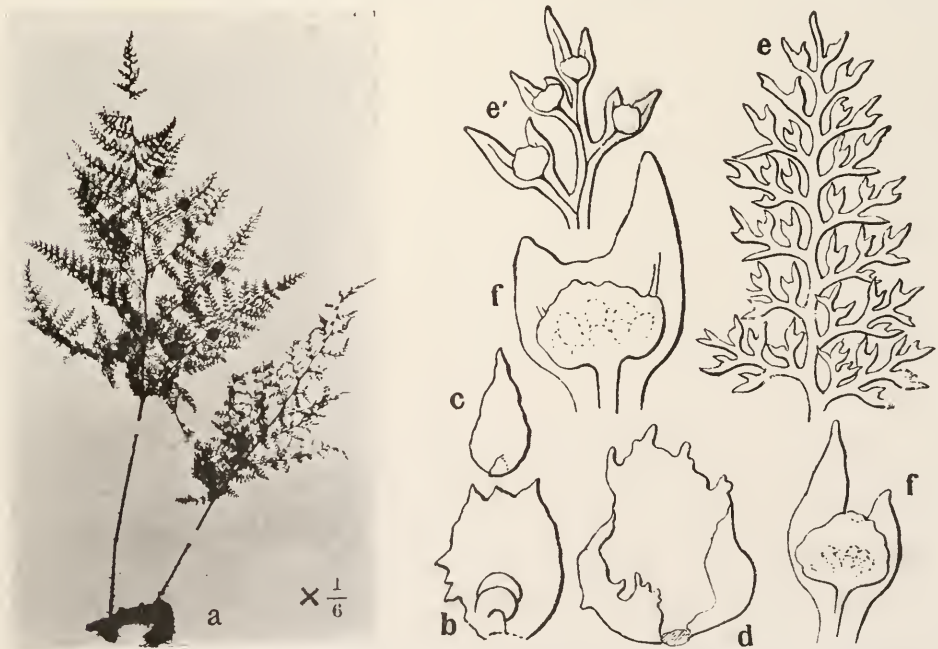


Fig. 139, *Davallia parvipinnula* HAYATA; a, the plant; b, a scale on the rhizome; c, a scale on the stipe; d, a stipule-like scale on the ramification of a pinnule; e, a portion of a pinnule; e', a portion of the same; f, a segment of an ultimate pinnule with a sorus; f', another segment of the same.



*pinnula* HAYATA Mater. Fl. Formos. p. 431. *Davallia Clarkei* HAYATA in Tōkyō Bot. Mag. XXIII. p. 27 (non BAKER).

HAB. Mt. Arisan; epiphyta ad truncos *Chamæcyparis* et *Taiwania*, leg. S. SASAKI, Mai., 1913.

Stipites 14 cm. longi glabri stramineo-rubescens basi plus minus purpurascens subteretes (supra) profunde 1-sulcati sursum 2-3-sulcati glabri haud squamati basi parce squamati, squamis elongato-triangularibus tenuibus leviter rubescentibus margine erosis apice obtusis. Frondes triangulares 19 cm. longæ basi 20 cm. latæ, pinnis utroque latere 15, infimis 3-pinnatis 10 cm. longis, inferioribus bi-pinnatis 6-7-8 cm. longis a se 3-4 cm. remotis, superioribus brevioribus simpliciter pinnatis 3-4 cm. longis a se 1-2 cm. remotis, sursum minoribus 3 mm.-1 cm. longis a se 3 mm. remotis; pinnis infimis sessilibus lanceolato-ovatis 10 cm. longis  $4\frac{1}{2}$  cm. latis, latere inferiore latiore  $2\frac{1}{2}$  cm. lato; pinnulis I. infimis brevioribus, (inferioribus longioribus sessilibus angustato-quadrangularibus a se 1-2 cm. remotis pinnatis); pinnulis II. ovatis inferioribus 6 mm. longis obtusis angustatis remote profundeque pinnatifidis, segmentis angustissimis remotis cochlearibus bicornutis cum cornibus 1-3 mm. longis  $1-\frac{1}{4}$  mm. latis basi stipitatis, (cornibus exterioribus longioribus interioribus brevioribus), sinibus inter cornua rotundatis; rhaches frondium supra leviter tenuissime bisulcatæ subtus convexæ utrinque glabræ; rhaches pinnarum subcomplanatæ supra plus minus sulcatæ subalatæ; paginæ membranaceæ utraque glabræ. Sori ad sinus furcæ venularum vel interdum ad angulos venularum flexarum ad centrum segmentorum pinnularum II. siti solitarii. Indusium semiglobosum  $\frac{2}{3}$  mm. latum  $\frac{1}{2}$  mm. longum basi leviter cordatum vel truncatum.

In addition to the original description, I may mention the following characters which are most important, so far as the modern pteridology is concerned. The rhizomes are creeping like that of *Davallia* and *Humata*, but the stipes are never inserted by articulation on the rhizomes. The fronds have scales which are very like stipules in flowering plants, on the point of ramification of pinnae, pinnules and segments, as is the case with *Acrophorus*.

The habit of this fern is extremely like that of *Davallia*. It is impossible to separate this species from that genus but for the difference of fructification



and the absence of articulation on the rhizomes. The present fern is somewhat near *Loxoscaphe gibberosum* MOORE (BAKER Syn. Filic. p. 100) from which it is distinguishable in having much narrower pinnules. It is, as I stated in my former paper, most closely allied to *Davallia Clarkei* BAKER (= *Humata Hookeri* DIELS = *Acrophorus Hookeri* MOORE) in its pinnatifidation of fronds and its subcordate indusia. So far as is concerned the delimitation of *Humata*, *Davallia* and *Acrophorus*, as stated by Prof. L. DIELS in ENGL. u. PRANTL Natür. Pfl.-fam., the present fern is different from *Davallia* in its having inarticulated stipes (which are not joined on the rhizome) and subcordate indusium. It comes nearer to *Humata* in its subcordate indusia and creeping rhizomes, but it is separable from that genus by the inarticulated stipes. It resembles *Acrophorus* in the inarticulated stipes, subcordate indusia, and in the presence of stipules, but widely different from that genus in the ramification of fronds, venation and in its creeping rhizomes. If these latter characters should necessitate the separation of our fern from *Acrophorus*, and the inarticulated stipes from *Humata*, it should constitute a special genus, *Leucostegia* PRESL. to which *Leucostegia immersa* and others are referred. Through the courtesy of Mr. E. D. MERRILL, I was so very fortunate as to know the opinion of Dr. COPELAND who was so kind as to send me the following note on this plant. According to Dr. COPELAND "this fern is congeneric with *Davallia athamantica* CHRIST, *Acrophorus Hookeri* MOORE (*Leucostegia*, BEDD., *Davallia Clarkei* BAKER), *Acrophorus pseudo-cystopteris* MOORE (*Leucostegia*, BEDD., *Davallia*, KZE.) and *Leucostegia pulchra* J. SM. (*Davallia*, DON, *Acrophorus*, MOORE). I would call it *Leucostegia* n. sp. None of the above species has a functional articulation of the stipe. And the base of some stipes of HAYATA's fern shows a vestigial articulation. The fern is related to *Davallia*, but not nearly to *Acrophorus*. The chaff at the base of the pinnae does indeed suggest *Acrophorus* strongly, but this is only an accidental resemblance. There are no such thickenings of the rhachis as in *Acrophorus* and its relatives *Diacalpe*, *Monachosorum* etc., and frond form and rhizome are very different."

***Microlepia* PRESL.**

***Microlepia grandissima* HAYATA** sp. nov. (Fig. 140). Rhizoma ?

Stipes 90–100 cm. longus stramineus nitidus basi 1 cm. in diametro. Frons in ambitu triangularis bipinnata circ. 100 cm. longa 90 cm. lata apice triangulari-acuta, pinnis infimis longissimis, superioribus gradatim brevioribus



Fig. 140, *Microlepia grandissima* HAYATA; a, the plant; b, a portion of a pinnule; c, a portion of the same; d, the same, with indusium.

sursum ad segmenta pinnæ terminalis abeuntibus, pinnis infimis 60 cm. longis oblique cuspidato-triangularibus basi 30–40 cm. latis apice cuspidato-acuminatis basi triangulari-acutis petiolatis, petiolis 3 cm. longis, pinnulis infimis (lateris inferioris) longissimis, pinnulis superioribus gradatim brevioribus ad

segmenta pinnulæ terminalis abeuntibus, pinnulis infimis 5 cm. a se remotis petiolulatis (petiolulis 2 cm. longis) triangulari-lanceolatis 22 cm. longis 8 cm. latis apice recto-acuminatis basi latissimis triangulari-truncatis deorsum fere ad rhachin inciso-lobatis sursum dentatis, segmentis vel lobis infimis triangulari-ovatis 4 cm. longis 2 cm. latis plus minus falcatis vel rectis apice acutis latere superiore latioribus margine subcartilagineo-marginatis serratis, serris acutis, segmentis lobis superioribus gradatim minoribus apicē acutis vel obtusis sursum rotundatis gradatim minoribus sursum ad crenam reductis; pinnis inferioribus a se 25 cm. remotis, a rhachibus angulo 60 divaricatis; rhachis frondis inferiore recta sed superiore repando-flexuosa, rhachis pinnularum et costa segmentorum repando-flexuosa superne non elevata dense hirsuta (pilis recurvis brevissimis) subtus elevata glabra, costis segmentorum a rhachibus pinnularum angulo acuto divaricatis, venis lateralibus supra non visis subtus tenuissime elevatis distinctis liberis simplicibus vel furcatis, venulis rectis; pagina superne glabra nitida viridis subtus sub lente pilis minutis parcellissime dispersa; textura membranacea vel tenuiter coriacea. Sori sub serris singulis loborum solitariter siti ab apice serrarum 2-1 mm. distantes venulas terminantes. Indusium reniforme 2 mm. latum 1 mm. longum margine superiore liberum crenulatum margine inferiore adnatum.

HAB. Arisan: Arisan-Tōzan, ad 8-9000 ped. alt., leg. B. HAYATA et S. SASAKI, 1912, Jan.

*Humata grandissima* HAYATA in sched. herb. Taihoku.

Near *Davallia platyphylla* DON (HOOK. et BAKER Syn. Fil. p. 99. = *Microlepia platyphylla* (MOORE) BEDD. Fer. South Ind. t. 13) and *D. lonchitidea* WALL. Hk. Sp. Fil. I. p. 173 t. 46, Brit. Exot. Fern. t. 19); but differs from them by the much larger fronds with more shallowly lobed pinnæ and pinnules. The sori are very much like those of *Humata*. The specimen lacking rhizomes, it is at present impossible to decide whether this is referable to *Microlepia* or *Humata*.

***Microlepia subpinnata*** HAYATA, sp. nov. (Fig. 141). Rhizoma subrepens teres 2-3 mm. in diametro pilis obtectum, pilis rubro-castaneis  $\frac{1}{2}$  mm.-1 mm. longis. Stipes 20 cm. longus intus (supra) profunde sulcatus subglabratus brevissime hirsutus. Frons ovato-lanceolata 50 cm. longa 24 cm. lata apice acuminata basi obtusa ad medium latissima subbipinnata vel

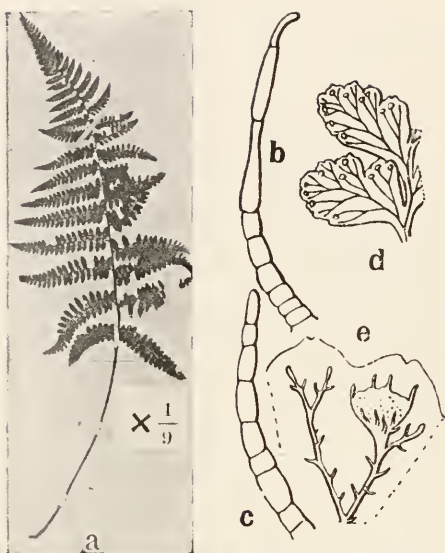


Fig. 141, *Microlepia subpinnata* HAYATA; a, the plant; b, c, hairs on the rhizome; d, a part of a pinna; e, a portion of a pinnule.

1899.

Near *M. Speluncæ*, but differs from it by the bipinnate fronds with subentire or lobed pinnules.

***Microlepia trichocarpa* HAYATA** sp. nov. (Fig. 142). Rhizoma? Stipes 25 cm. longus teres basi 3–4 mm. latus patento-hirsutus intus (supra) profunde sulcatus, pilis patentissimis 1–3 mm. longis pluricellularibus. Frons ovato-lanceolata apice acuto-acuminata infra medium latissima basi minus lata basi abrupte truncata 40–50 cm. longa 22 cm. lata bipinnata, pinnis longissimis lineari-lanceolatis 12 cm. longis 3 cm. latis angulo recto a costa divaricatis apice acuminato-obtusis (a se 3 cm.

bipinnatifida, pinnis mediis lanceolatis 12 cm. longis basi latissimis  $3\frac{1}{2}$  cm. latis sessilibus apice acuminatis a se 4–5 cm. remotis, pinnulis inferioribus oblique quadrangularibus 2 cm. longis 1 cm. latis apice obtusissimis basi cuneato-acutis sessilibus basi obliquis margine lobulatis truncatis vel subrotundatis; rhachis, costa vel costula supra glabra profunde sulcata subtus densissime brevissime hirsuta, pilis subadpressis; textura membranacea tenuissima brevissime hirsuta vel subglabrata. Sori submarginales vel a margine  $\frac{1}{2}$ –1 mm. distantes.

HAB. Rahō, leg. K. MIYAKE, Oct.



Fig. 142, *Microlepia trichocarpa* HAYATA; a, the plant; b, a hair on the stipe; c, a pinnule; d, a portion of the same.



remotis basi truncatis subsessilibus vel breve petiolatis, (petiolis 3 mm. longis), pinnulis quadrangulati-oblongis  $1\frac{1}{2}$  cm. longis 7 mm. latis apice rotundato-obtusis basi latere superiore lato truncatis latere inferiore anguste acutis ad petiolulum 1 mm. longum abeuntibus vel sessilibus duplicato-lobulatis, lobis vel lobulis rotundato-obtusis brevissimis; rhachis, costa vel costula toto hirsuta; textura membranacea tenuis utraque pagine hirsuta. Sori marginales ad sinus lobulorum approximativim siti. Indusium cupuliforme pilosum margine libero ciliatum.

HAB. Arisan, leg. B. HAYATA et S. SASAKI, Jan. 1912.

Near *M. subpinnata* HAYATA, but differs from it by the setulose indusium and very much more hirsute fronds.

*Lindsaya* DRY.

***Lindsaya kusukusensis*** HAYATA sp. nov. (Fig. 143). Rhizoma repens tenue teres 1 mm. in diametro parce squamatum, squamis lineari-filiformibus vel piliformibus non adpressis 1 mm. longis castaneis. Stipes 5 cm. longus  $\frac{2}{3}$  mm. in diametro glaber tenuis intus (supra) leviter sulcatus.

Frons linearis

30 cm. longa

$1\frac{1}{2}$  cm. lata

apice gradatim

attenuata obtusa

basi gradatim

attenuata pin-

nata, pinnis

utroque latere

50-60, mediis

semi-lunaribus

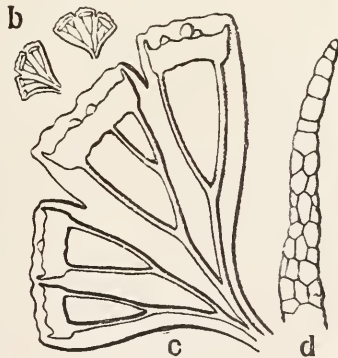


Fig. 143, *Lindsaya kusukusensis* HAYATA; a, the plant; b, pinnæ; c, a pinna; d, a scale on the rhizome.

$\frac{1}{2}$  cm. a se remotis 7 mm. longis 5 mm. latis unilateralibus latere superiore lato rotundatis (basi latere superiore truncatis 4 mm. longis) basi subito cuneatis ad petiolulum subnullum abeuntibus margine remote leviter lobulatis, lobulis

latissimis 3 mm. latis  $\frac{3}{4}$  mm. longis apice truncatis; venis subfurcatis; textura membranacea. Sori in lobulis singulis solitarii latissimi marginales.

HAB. Kusakusu, Jun. 1912, leg. B. HAYATA et S. SASAKI.

Near *L. cultrata* Sw., but differs from it by the much narrower and longer fronds with smaller and broader pinnæ; also allied to *Lindsaya linearis* Sw. (in KUNZE Farnkräuter I. t. 16-1) and *Lindsaya gracilis* = *Lindsaya securifolia* PRESL. (KUNZE Farnkräuter I., t. 85-1), in the linear lanceolate simple pinnate fronds. Perhaps a form of *L. cultrata*, Sw.

*Diplazium* Sw.

***Diplazium arisanense* HAYATA** sp. nov. (Fig. 144). Rhizoma ascendens erectum. Stipes tenuis 30 cm. longus teres 2 mm. latus basi squamatus sursum glabratus, squamis castaneis linearibus lanceolatis usque 8 mm. longis usque  $1\frac{1}{2}$  mm. latis. Frons 40 cm. longa 16 cm. lata ovato-lanceolata apice acuminata basi in ambitu rotundata bipinnata vel bipinnatifida, pinnis infimis minus longis, mediis longissimis lanceolatis 13 cm. longis  $3\frac{1}{2}$  cm. latis apice acuminatissimis basi latissimis trun-

catis pinnatis vel pinnatifidis sessilibus vel inferioribus brevissime petiolatis, pinnulis infimis longissimis ovato-oblongis  $2\frac{1}{2}$  cm. longis 13 mm.

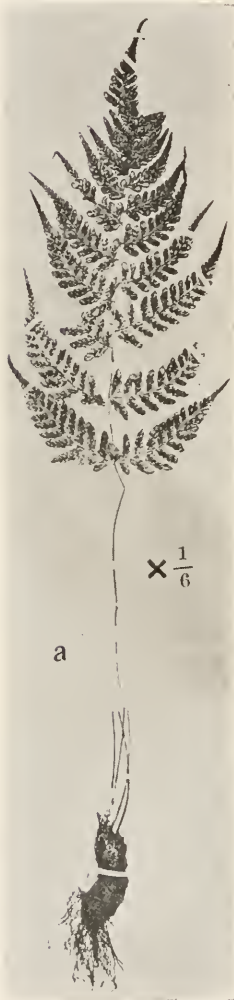


Fig. 144, *Diplazium arisanense* HAYATA; a, the plant; b, a portion of a pinna; c, a sorus of the *Athyrium*-type; d, another sorus of the *Diplazium*-type.

latis apice in ambitu obtusis basi late cuneatis ad insertionem 3 mm. latis sessilibus paullo inaequalateralibus margine leviter lobulatis, lobulis pauce

serratis, serris acutis ascendentibus, vel pinnulis sursum serratis, serris acutis; textura herbacea; pinnæ a rhachibus frondium  $50^{\circ}$ – $60^{\circ}$  divaricatæ ascendentorecurvæ, pinnis inferioribus a se  $4\frac{1}{2}$  cm. remotis, pinnulis inferioribus a se 1 cm. remotis; costa pinnarum sursum supra canaliculata secus canaliculum utroque remote setulosa, setulis circ. 1 mm. longis. Sori secus costulam utroque latere uniseriatim dispositi.

HAB. Arisan, leg. B. HAYATA et S. SASAKI, Jan. 1912.

**Diplazium  
costalisorum**

HAYATA sp. nov.

(Fig. 145). Rhizoma? Stipes 40 cm. longus parce squamatus fusco-stramineus. Frons triangularis 60 cm. longa totiusque lata apice in ambitu triangulari-acuta ad summum cuspidata basi latissima bipinnata, pinnis infimis longissimis 30 cm. longis 16 cm. latis ovato-oblongis apice cuspidato-acuminatis, (acuminibus linearibus 2–3 cm. longis 3 mm. latis ob-



Fig. 145, *Diplazium costalisorum* HAYATA; a, the plant; b, apical portion of a pinnule; c, a pinnule; d, a sorus of the *Allantodia* type

scure dentatis vel subintegris) basi obtusis (petiolis 3 cm. longis), pinnulis mediis longissimis 7 cm. longis, inferioribus brevioribus 5 cm. longis totis lanceolatis sessilibus æquilateralibus apice acuminatis basi truncatis margine (excepto acumine) regulariter lobulatis, lobulis quadrangularibus 7 mm. longis 5 mm. latis apice truncatis margine subintegris; textura coriacea; pinnis a rhachibus frondium angulo  $50^\circ$  divaricatis, pinnulis a rhachibus pinnarum angulo  $70^\circ$ – $90^\circ$  divaricatis; pinnis inferioribus a se 10 cm. remotis, pinnulis inferioribus a se 2 cm. remotis. Sori secus prope costulas utroque latere uni-seriatim siti oblongo-lineares 3–4 mm. longi 1 mm. lati elevati.

HAB. Urai, leg. B. HAYATA et S. SASAKI, Juli., 1912.

**Diplazium isobasis** CHRIST Bull. Herb. Bois. 2<sup>m</sup> série IV. (1904) p. 618.

HAB. in declivitalibus humidis Takao, leg. U. FAURIE, Aprili. 1903.

**Diplazium bicuspe** HAYATA sp. nov. (Fig. 146). *Asplenium bicuspe* HAYATA. Rhizoma erectum breve. Stipes cæspitosus erectus 4 cm. longus complanatus 2 mm. latus squamatus, squamis fusco-nigrescentibus lineari-lanceolatis 3 mm. longis  $\frac{1}{3}$  mm. latis apice subulato-acuminatis basi truncatis. Frons lanceolata vel oblanceolata vel lineari-lanceolata 28–30 cm. longa 2 cm. vel  $2\frac{1}{2}$  cm. lata apice acuminata sæpe 2–3 lobata, (lobis cuspidiformibus triangularibus apice acuminatis, acuminibus recurvis vel erectis), basi gradatim longe attenuata ad stipitem abeuns margine irregulariter undulata vel remote denticulata vel subintegra; textura herbacea crassiuscula supra viridis subtus pallidior supra glabra subtus deorsum parce minute squamata vel subglabra sursum glabra, costa utraque pagine complanata elevata, venis et venulis utraque pagine non visis. Sori secus costam utroque latere 1-seriatim dispositi lineares a costa 1 mm., a margine 2–3 mm. distantes.

HAB. Arisan, ad 7000 ped. alt., leg. B. HAYATA et S. SASAKI, Jan. 1912.

Very near *Asplenium ensiforme* WALL. (HOOK. et GR. Ic. Fil. t. 71) and *Asplenium apoense* COPELAND, but differs from them by the entire involucre and in having fronds which are sometimes 2–4-lobed at the apex. The sori of this fern are usually of the *Asplenium*-type, but sometimes are of the *Diplazium*-or *Scolopendrium*-type.





Fig. 146, *Diplazium bicuspe* HAYATA; a, the plant; b, a scale at the base of the stipe; c, a portion of the frond; d, a portion of the same, showing two kinds of indusia.

***Diplazium Kawakamii* HAYATA** (Fig. 147). Mater. Fl. Formos. p. 435. Stipites 55 cm. longi complanato-tetragoni 4-sulcati basi 7 mm. lati fuscentes tota longitudine dense piloso-squamati, (squamis linearibus incrassatis sub-teretibus plus minus complanatis basi muricatis fuscentibus plus minus crispatis 3-4 mm. longis patento-reflexis vel depresso-reflexis). Frondes

late ovatae 87 cm. longae 60 cm. latae apice acutae basi obtusae tripinnatae superiore bi-pinnatae, pinnis lanceolatis utroque latere 10 a rhachibus frondium angulo  $40^{\circ}$ – $60^{\circ}$  divaricatis inferioribus 40–45 cm. longis a se 13–17 cm.



Fig. 147, *Diplazium Kawakamii* HAYATA; a, the plant of a tripinnate form; b, the plant of a bipinnate form; c, viscid hairs on the stipe; d, a pinnule; e, a sorus of the *Allantodia*-type.

remotis, pinnis infimis longissimis 45 cm. longis 17 cm. latis apice acuminatis obtusis longe vel breve petiolatis (petiolis 3–4 cm. longis), remote

pinnatis, pinnulis I. utroque latere 20 inferioribus 5 cm. a se remotis ovato-lanceolatis 10 cm. longis 33 mm. latis apice acuminatis (acuminibus linearibus) basi obtusis breve petiolulatis (petiolulis 3 mm. longis) etiamque pinnatis, pinnulis II. utroque latere 18 inferioribus a se 8 mm. remotis lanceolatis  $1\frac{1}{4}$  cm. longis 6 mm. latis apice obtusis basi obtusis prope basin latissimis basi constrictis 2 mm. latis latere inferiore plus minus decurrentibus margine truncato-dentatis, (dentibus utroque latere 8 infimis longissimis obtusis interdum paucissime serratis 3 mm. longis 2 mm. latis apice truncatis ascendentibus); pinnulis I. apice attenuato-acuminatis dentato-lobulatis, lobulis vel dentibus truncatis ascendentibus; rhaches frondium complanato-tetragonæ supra et subtus late leviter sulcatæ vel simpliciter concavæ basi 4 mm. latæ inferiore dense superiore paucissime squamatis, squamis fuscantibus filiformibus patento-reflexis; rhaches pinnarum complanatæ subtetragonæ supra sulcatæ utroque latere sulcorum elevato-alatæ subtus convexæ stramineæ subglabræ; rhaches pinnularum complanatæ supra sulcatæ subtus elevatæ latere alatæ etiamque secus sulcos utroque latere prominente verticaliterque alatæ (alis secus sulcos hac atque illac interruptis  $\frac{3}{4}$  mm. latis); paginæ exsiccatæ supra fuscentes glabræ subtus plus minus pallidiores subglabræ, venis et venulis supra impressis subtus leviter elevatis. Sori juxta costam sub quoque dente singuli ad venulas unilaterales sed ad basin venularum bilaterales oblongi prominentes  $1\frac{1}{2}$  mm. longi  $\frac{3}{4}$  mm. lati utrinque obtusi.

HAB. Tōsan, leg. T. KAWAKAMI et G. NAKAHARA, 1906.

**Diplazium leiopodum** HAYATA sp. nov. (Fig. 148). Rhizoma ascendento-erectum. Stipes cespitosus 16 cm. longus basi squamatus sursum glabratus purpureo-cineraceus vel cineraceus, squamis lanceolatis linearibus acuminatis nigricantibus 6 mm. longis  $\frac{1}{2}$  mm. latis. Frons triangulari-lanceolata 20 cm. longa basi latissima 11 cm. lata apice gradatim caudato-acuminata basi truncata bipinnata vel sursum pinnata, pinnis mediis angulo recto a rhachibus divaricatis a se 2 cm. remotis lanceolatis apice gradatim acuminatis basi truncatis subsessilibus 5 cm. longis  $1\frac{1}{2}$  cm. latis a medio basi æquilatis brevissime petiolatis versus basin pinnatis sursum lobulatis, lobulis gradatim versus summum ad serrulas abeuntibus, pinnulis



infirmis oblongis ovatis 8 mm. longis 5 mm. latis apice truncatis apice margineque



denticulatis basi subito late acutis sessilibus vel adnatis; pinnis infimis plus minus desuper reflexis; textura membranaceo-coriacea: costae pinnarum supra leviter canaliculatae utroque latere interrupte 1-costulatae, costulis remote setulosis; costae supra glabrae, subtus pilis unicellularibus glandulosis obtectae; venis venulisque supra non elevatis subtus elevatis. Sori utroque latere costulae pinularum et loborum 1-seriatim dispositi semi-oblongi.

HAB. Arisan, leg. B. HAYATA et S. SASAKI, Jan., 1912.

Very near *D. tenuicaule* HAYATA, but distinguishable only by the indusia which are in *D.*

FIG. 148, *Diplazium leiopodium* HAYATA; b, a scale on the rhizome; c, a lobe of an upper pinna; d, an indusium of the *Athyrium*-type.



*leipodium* denticulate, while in *D. tenuicaule* they are nearly entire.

**Diplazium subrigescens**

HAYATA sp. nov.

(Fig. 149). *Athyrium subrigescens*

HAYATA in herb.

Taihoku. Rhi-

zoma ascen-

dento - erectum.

Stipes usque ad

26 cm. longus

albo - stramineus

basi nigrescens

basi plus minus

lanceolato-dilata-

tus basi dense

superiore parce

squamatus sur-

sum glabratus,

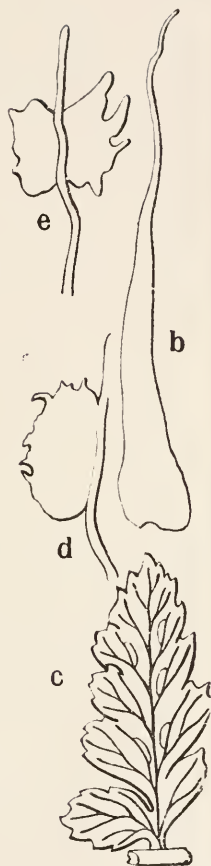


Fig. 149, *Diplazium subrigescens* HAYATA; a, the plant; b, a scale of the rhizome; c, a pinnule; d, an indusium of the *Athyrium*-type; e, another indusium of the *Diplazium*-type.

squamis inferioribus cuspidato-lanceolatis acuminatis basi cordato-rotundatis vel rotundatis margine integris usque 1 cm. longis usque 2 mm. latis nigrescentibus. Frons cuspidato-ovata usque 25 cm. longa usque 20 cm. lata apice longe caudata a medio usque ad basin aequilata sursum subito ad caudam abeuns bipinnata, pinnis mediis vel basilaribus subaequalibus lanceolatis 10 cm. longis 2 cm. latis apice acuminatis (acumine lineari tenuissimo 1-2 mm. lato) basi sessilibus truncatis aequilateralibus, pinnulis sessilibus fere toto aequilongis, mediis oblique oblongis vel semitriangularibus 1 cm. longis 5 mm. latis latere superiore auriculatis latere inferiore emucatis margine duplicato-dentatis vel serrulatis,

apice in ambitu obtusis vel rotundatis serrulatis, serrulis pinnularum acutis.



Fig. 130, *Diplazium tenuicaule* HAYATA; a, the plant; b, a pinnule (upper one); c, a sorus of the *Allantodia*-type.

Rhachis frondis albo-straminea supra sulcata in sulcis  $\pm$  pubescens; rhachis pinnae anguste canaliculata in canaliculo  $\pm$  pubescens supra remote alternatim setulosa; costula pinnularum supra impressa remote setulosa; pagina subherbacea rigescens utraque subglabra; pinnis a rhachibus frondis, pinnulis a rhachibus pinnae angulo  $80^{\circ}$ – $90^{\circ}$  egressis, pinnis inferioribus a se  $2\frac{1}{2}$  cm. remotis, pinnulis a se 5 mm. a se remotis. Sori secus costulam utroque latere 1-seriatim dispositi, latere singulo venae siti vel rarius utroque latere venae dispositi.

HAB. Arisan, ad 7000 ped. alt., leg. B. HAYATA et S. SASAKI, Jan., 1912.

Allied to *Athyrium rigescens* MAKINO.

Whether this new fern and its allied species should be referred to *Athyrium* or *Diplazium*, is very questionable. The habit of these ferns is rather of the *Athyrium*-type, but the sori are sometimes of the *Diplazium*-type. Very remarkable for its having very long slender tails at the apex of the pinnae.

***Diplazium tenuicaule* HAYATA**  
sp. nov. (Fig. 150). Rhizoma? Stipes 20 cm. longus subglaber cinereo-purpurascens. Frons 30 cm. longa 16 cm. lata apice gradatim acuminata basi truncata pinnata vel bipinnatifida, pinnis medio basi æquilongis a se 3 cm. remotis

a rhachibus frondium angulo  $80^\circ$  egressis longe lanceolatis 9 cm. longis basi latissimis 3 cm. latis truncatis apice acuminatis pinnatis sursum pinnatilobis, lobulis versus summum ad serrulas abeuntibus, pinnulis infimis oblongo-rectangularibus 15 mm. longis 8 mm. latis apice rotundatis basi truncatis margine apiceque denticulatis latere lobulatis, lobulis apice denticulatis. Textura herbacea, pagina supra ad costam remote setulosa subtus ad costam pilis unicellularibus glandulosis oblecta, cæterum glabra. Sori secus costas pinnularum vel loborum utroque latere 1-seriatim dispositi.

HAB. In monte Arisan, leg. B. HAYATA et S. SASAKI, Jan., 1912.

**Diplazium Textori** (MIQ.)

Compared with a specimen so labelled in the herbarium at Tōkyō.

HAB. Arisan, leg. B. HAYATA et S. SASAKI, Jan., 1912.

**Asplenium** LINN.

**Asplenium adiantum nigrum** LINN. (Fig. 151).

*Athyrium adiantum nigrum* (LINN.).

HAB. Montibus centralibus, leg. U. MORI, Dec. 1908. Observ. : Rhizoma erectum. Stipes cæspitosus usque 7 cm. longus inferiore rubro-purpurascens sursum castaneus basi dense squamatus, squamis inferioribus rubro-atropurpurascentibus subulato-lanceolatis 5 mm. longis  $\frac{1}{2}$  mm. latis apice subulato-filiformibus basi angulato-rotundatis peltatis margine subintegris, squamis superioribus filiformibus plus minus pilosis, sursum glaber. Frons triangulari-oblonga vel ovato-oblonga 10 cm. longa 7 cm. lata apice acuminata ad summum obtusa basi ambitu rotundata bipinnata vel tripinnatifida, pinnis inferioribus longissimis a se  $1\frac{1}{2}$  cm. remotis angulo  $45^\circ$ – $50^\circ$  a rhachibus egressis, infimis longissimis  $4\frac{1}{2}$  cm. longis  $2\frac{1}{2}$  cm. latis ovato-triangularibus apice lineari-acuminatis sed ad summum obtusis basi triangulari-acutis breve petiolatis (petiolis 3 mm. longis), rhachibus complanatis 1 mm. latis, pinnulis primariis inferioribus a se 6 mm. remotis angulo  $45^\circ$  a rhachibus egressis  $1\frac{1}{2}$  cm. longis 6 mm. latis triangulari-lanceolatis apice lineari-acuminatis ad summum obtusis basi cuneatis breve petiolulatis (petiolulis  $1\frac{1}{2}$  mm. longis) basi pinnatifidis, segmentis obovatis 4 mm. longis 2 mm. latis sursum margine serratis basi integris apice obtusissimis basi cuneatis; segmentis ultimis cum rhachibus pinnarum subaequilatis. Textura herbacea crassiuscula. Sori



Fig. 151, *Asplenium adiantum nigrum* LINN; a, the plant; b, a scale; c, a pinnule; d, a sorus of the *Athyrium* type.

secus costulas pinnularum utroque latere 1-seriatim dispositi firme approximati lunulares vel interdum sursum firme recurvi.

Compared with an European specimen so labelled in the herbarium at Tōkyō. Perhaps one of the varieties of this species.



**Asplenium iridiphyllum** HAYATA sp. nov. (Fig. 152). Rhizoma erectum brevissime squamatum, squamis cuspidato-lanceolatis 6 mm. longis  $1\frac{1}{2}$  mm. latis apice cuspidatis basi rotundatis vel subpeltatis margine subintegris vel remote subdenticulatis. Stipes cæspitosus brevissimus vel nullus basi squamatus, squamis subulato-lanceolatis 4 mm. longis  $\frac{1}{2}$  mm. latis apice subulatis basi rotundatis subpeltatis margine longe remoteque ciliatis fusco-castaneis. Frons lanceolata apice gradatim acuta ad summum obtusa basi attenuatissima ad stipitem brevissimum abeuns subsessilis 27 cm. longa 28 mm. lata margine irregulariter crenulata subundulato-plicata simplex versus apicem ascendente-denticulata supra glabra subtus præsertim prope costam vel versus apicem squamis minutis parce dispersa, squamis irregularibus

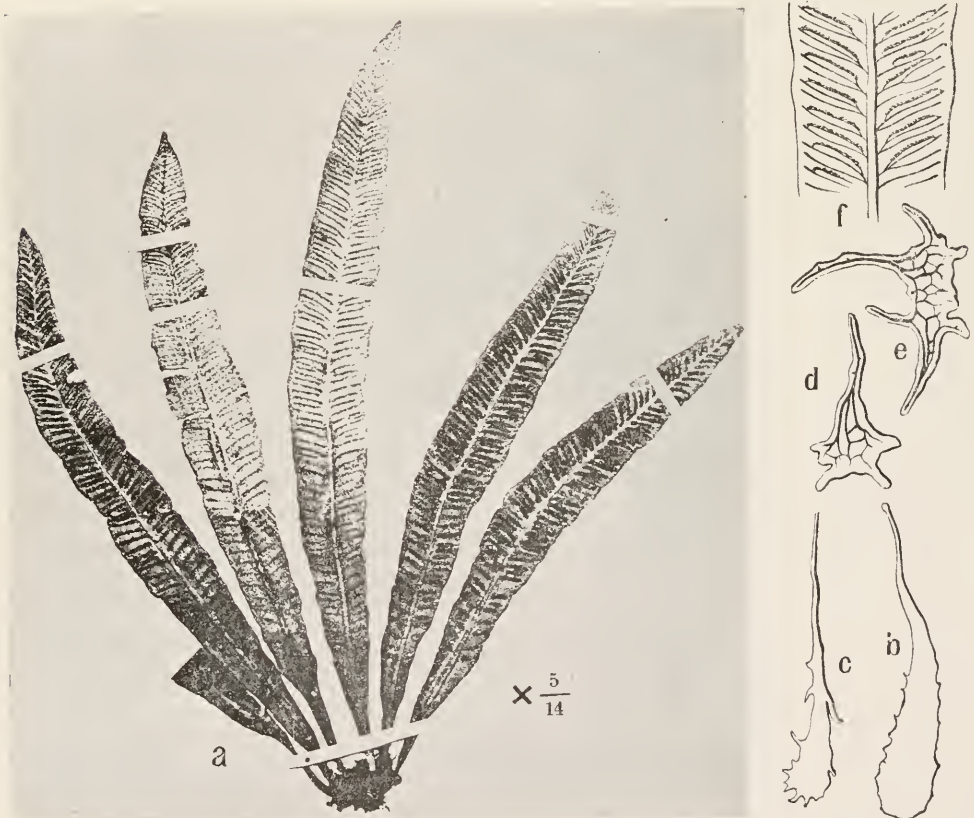


Fig. 152, *Asplenium iridiphyllum* HAYATA; a, the plant; b, a scale on the rhizome; c, a scale on the stipe; d, e, amœboïd scales on the under surface of the upper portion of the frond.



Fig. 153, *Asplenium lasiniatum* DON; a, the plant; b, a scale on the rhizome; c, a pinna, seen from below; d, a gemmiferous pinna, seen from above; e, a gemma.

anceboideis multiradiatis  $\frac{1}{2}$  mm. in diametro fusco-nigricantibus; pagina supra primum parce squamata demum glabra, costis subtus elevatis, venis venulis subtus non visis. Textura rigide herbacea vel membranacea.

HAB. Shintiku: Goshō-san, leg. U. MORI, Juni., 1906.

The sori are usually of a kind of the *Asplenium*-type, but sometimes, though very rarely, present transitional forms towards the *Diplazium*-type. In this respect, the fern may also be referable to *Diplazium*.

***Asplenium lasiniatum* DON;** (Fig. 153) HAYATA Fl. Mont. Formos. p. 243.

HAB. Mt. Arisan, leg. B. HAYATA et S. SASAKI, Jan., 1912.

***Asplenium Makinoi* HAYATA n. n.** (Fig. 154). *Diplazium Makinoi* YABE in sched. herb. Tōkyō, in MATSUM. et HAYATA Enum. Pl. Formos. p. 600. Rhizoma? Stipes 20–22 cm. longus

flavo-stramineus subglaber complanatus  $2\frac{1}{2}$  mm. latus parce squamatus, squamis lanceolatis 4 mm. longis nigricantibus. Frons 23 cm. longa totiusque lata in ambitu subrotundata apice in ambitu rotundata basi in ambitu acuto-truncata simpliciter pinnata, pinnis utroque latere 2-3, pinna terminali iis lateralibus conformi aequilonga lanceolata 14 cm. longa 21 mm. lata apice lineari-acuminata (acumine 2 cm. longo 1-2 mm. lato) basi subito attenuata ad petiolum abeunti (petiolo 2 cm. longo) margine irregulariter denticulato-crenulata tenniter desuper angustissime recurva. Textura herbacea crassiuscula subtus pallidissima supra glabra subtus squamis cuspidato-ovatis vel amœboidalibus minutis parce dispersa pellicida, costis utraque pagine elevato-complanatis, venis venulis utraque pagine tenuissimis distincte visis, pinnis lateralibus subsessilibus vel brevissime petiolatis; rhachis angustissime alata. Sori prope costam secus costam 1-seriatim utroque latere dispositi a costa 2 mm., a margine 3-4 mm. remoti.

HAB. Uraisha, leg. S. SASAKI, Oct., 1910.

The fern was named several years ago by Mr. Y. YABE; but the author's original description has never been published. The above description is drawn from a specimen which is quite identical with the type. So far as I have examined, the sori are of the *Asplenium*-type, but not of the *Diplazium*-type.

Near *Asplenium Wighlianum* WALL. figured in HOOKER Sp. Fil. III. p. 105 t. 167.

***Asplenium Matsumuræ* CHRIST.**

HAB. Tōtōshō, leg. T. KAWAKAMI et S. SASAKI, Juli. 1912.

Compared with a co-type preserved in the herbarium at Tōkyō.

***Asplenium morrisonense* HAYATA n. n.**

*Asplenium laserpitiifolium* LAM. var. *morrisonense* HAYATA Mater. Fl. Formos. p. 438.

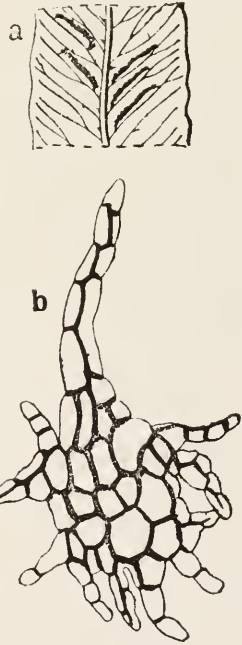


Fig. 154, *Asplenium Makinoi* HAYATA; a, a portion of a pinna; b, as seen on the under surface of the frond.

HAB. Arisan, leg. B. HAYATA et S. SASAKI, Jan., 1912.

***Asplenium planicaule* WALL.**

HAB. Arisan, ad 7000-6000 ped. alt., leg. B. HAYATA et S. SASAKI, Jan., 1912.

Compared with a Japanese specimen so labelled in the herbarium at Tōkyō.

***Asplenium resectum* SM. form. *adiantifrons* (Fig. 155).**

HAB. Arisan, ad 7000 ped. alt., leg. B. HAYATA et S. SASAKI, Jan., 1912.

This form is so widely different from the ordinary one of *A. resectum* that I thought it to be a distinct species. But, examining closely, I have found that there are many transitional forms between this and the ordinary one.

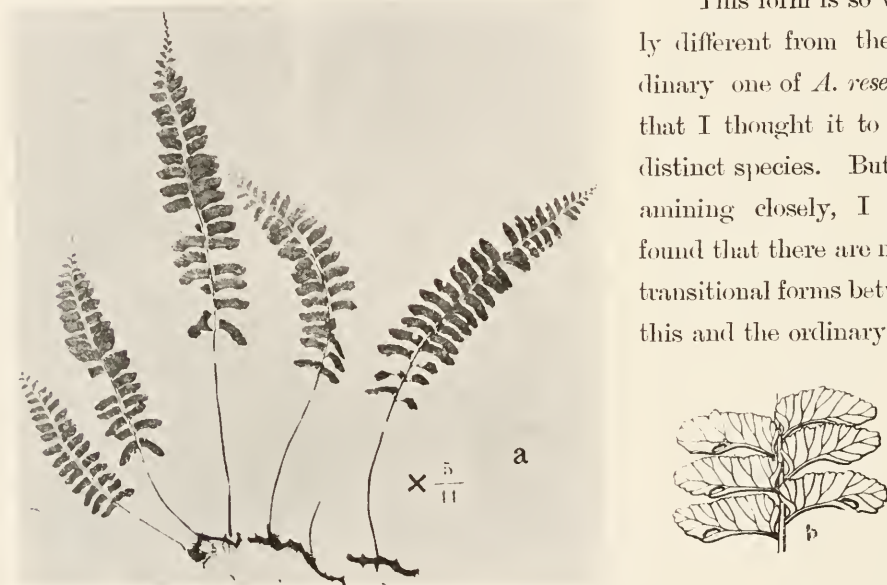


Fig. 155, *Asplenium resectum* SM. form. *adiantifrons*; a, the plant; b, a portion of a frond.

This fern, therefore, though strikingly different from *A. resectum*, will not claim to be a distinct from the named species, nor even a variety of the latter.

***Asplenium ritoense* HAYATA sp. nov. (Fig. 156).** Rhizoma erectum? brevissimum apice squamis dense obtectum, squamis ovato-lanceolatis 2 mm. longis apice obtusis vel acuminatis basi leviter cordatis vel truncatis ferrugineo-nigris margine setulosis. Stipes  $1\frac{1}{2}$ -2 cm. longus frondibus brevior basi plus minus squamifer toto longitudine (basi excepto) alatus cum alis  $1\frac{1}{2}$  mm. latus. Frons elongato-triangularis 3 cm. longa 18 mm. lata pinnatifida apice obtusa basi late truncata, segmentis infimis 5 mm. a se remotis late ovatis



9 mm. longis 7 mm. latis apice obtusis vel truncatis basi subito cuneatis subpetiolulatis inciso-lobatis, lobis brevissimis  $\pm$  acutis sorum singulorum gerentibus; rhachis frondium alata cum alis  $1\frac{1}{2}$  mm. lata; textura herbacea utraque pagine glabra, costis venis lateralibus supra distincte elevatis subtus non elevatis obscuris. Sori latere lorum singulo proxime siti. Indusium lunulare margine uni-seriatim rubropunctatum  $1\frac{1}{3}$  mm. longum  $\frac{1}{2}$  mm. latum.

HAB. Mt. Ritōzan, ad 6500 ped. alt., lge. T. KAWAKAMI, Juli. 1913.

Near *A. davallioides* HOOK.

***Asplenium rutæfolium* KUNZE.**

*Asplenium prolongatum* HOOK. f.

HAB. Arisan, leg. B. HAYATA et S. SASAKI, Jan., 1912.

Compared with a specimen so labelled in the Tōkyō herbarium.

***Asplenium scolopendrifrons* HAYATA sp. nov.** (Fig. 157). Rhizoma breve erectum squamatum, squamis cuspidato-lanceolatis fusco-castaneis 3–4 mm. longis  $\frac{1}{2}$  mm. latis apice subulatis

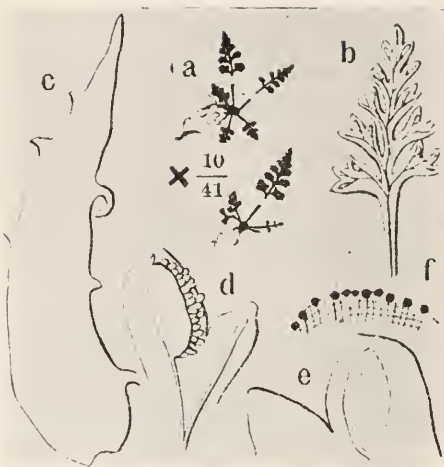


Fig. 156, *Asplenium ritoense* HAYATA; a, the plant; b, a frond; c, a scale on the rhizome; d, apical portion of a frond; e, another portion of the frond with an indusium before opening; f, margin of an indusium.



Fig. 157, *Asplenium scolopendrifrons* HAYATA; a, the plant; b, a scale on the rhizome; c, d, amoeboid scales on the lower surface of the frond; e, a portion of the frond; f, an indusium.

basi rotundatis subpeltatis margine remote dentato-ciliolatis vel subintegris. Frons oblanceolata 13 cm. longa  $1\frac{1}{2}$  cm. lata apice obtusa vel obtusissima basi longe attenuata ad stipitem brevissimum abeuns margine tenuissime recurva irregulariter crenulata supra subglabra subtus parce squamis dispersa, squamis minutis amœboideis multiradiatis  $\frac{1}{2}$  mm. in diametro. Textura herbacea. Sori lunulati secus costas prope marginem extensi approximati utroque latere 1-seriatim dispositi.

HAB. Arisan, leg. S. SASAKI.

Near *Asplenium scolopendrioides* J. SM. but differs from it by the much smaller fronds with very obtuse apex.

***Asplenium tenuicaule* HAYATA** sp. nov. (Fig. 158). Rhizoma erectum



brevissimum. Stipes cæspitosus tenuissimus 5 cm. longus subtus (extus) atro-rubro-purpurascens basi squamatus sursum glabratus, squamis inferioribus cuspidato-lanceolatis 3 mm. longis  $\frac{2}{3}$  mm. latis basi cordato-decurrentibus rotundatis margine integris remote pauceque glanduloso-ciliolatis vel obsoletis, superioribus linearibus minoribus. Frons lanceolata vel lineari-lanceolata 8 cm. longa 2 cm. lata apice acuminata basi obtusa bipinnatifida, pinnis oblongis 13 mm. longis 6 mm. latis apice obtusissimis basi cuneatis, petiolis 2 mm. longis, pinnulis obtriangulatis vel obovatis apice lobatis basi angusto-cuneatis, lobis acutis. Textura tenuissime herbacea. Sori lineares lunulati 3 mm. longi.

Fig. 158, *Asplenium tenuicaule* HAYATA; a, the plant; b, a scale on the rhizome; c, a pinna.

HAB. Arisan, ad 6000-7000 ped. alt., leg. B. HAYATA et S. SASAKI, Jan., 1912.

Near *Asplenium pkinense* HANCE, but differs from it by the broader lobes of the pinnules.

***Asplenium tenuissimum* HAYATA** sp. nov. (Fig. 159). Rhizoma brevissimum erectum tenue. Stipes cespitosus semiteres levis tenuissimus 15 cm. longus nitidus intus (supra) canaliculato-planus viridis subtus extus convexus nigro-rubro-purpurascens nitidissimus parce squamatus, squamis inferioribus cuspidatis 3 mm. longis basi 1 mm. latis, superioribus linearibus



Fig. 159. *Asplenium tenuissimum* HAYATA; a, the plant; b, a scale on the rhizome; c, a pinnule; d, apical portion of the same with a sorus.

piliformibus 2-3 mm. longis rubro-purpurascens. Frons tenuissima herbacea viridissima lanceolata apice acuminata basi truncata 25 cm. longa  $7\frac{1}{2}$  cm. lata tripinnata vel tripinnatifida, pinnis oblongo-lanceolatis, inferioribus longioribus, infimis paullo brevioribus, mediis a se  $1\frac{1}{2}$  cm. remotis a rachibus frondium angulo  $70^{\circ}$ - $80^{\circ}$  divaricatis oblongis vel oblongo-lanceolatis apice obtusis basi acutis vel oblique truncatis 3 cm. longis  $1\frac{1}{2}$  cm. latis latere superiore latioribus quam latere inferiore, pinnulis ordinis primarii infimis latere superiore

ab axilla 1-2 mm. remotis, a se 5 mm. remotis oblongis apice obtusis basi acutis 1 cm. longis 6 mm. latis, pinnulis ordinis secundarii oblongis integris vel 2-3 lobatis apice acutis basi cuneatis 3-4 mm. longis 1-2 mm. latis. Sori sub lobo vel pinnula ordinis secundarii singuli lunulares  $1\frac{1}{2}$  mm. longi.

HAB. Arisan, ad 6-7000 ped. alt., leg. B. HAYATA et S. SASAKI, 1912, Jan.

Near *Asp. tenuifolium* DON, (HOOK. 2nd Cent. Fern. t. 29, BEDD. Fern. South Ind. t. 130, Handb. Fern. Brit. Ind. p. 161, fig. n. 78), but differs from it by the narrower fronds with much remoter pinnæ.

***Asplenium unilaterale* LAM. var. *obliquissimum* HAYATA n. v.** (Fig.



Fig. 160-A, *Asplenium unilaterale* LAM. var. *obliquissimum* HAYATA; a, the plant.



160A-B). Rhizoma repens teres tenuissimum  $1\frac{1}{2}$  mm. in diametro squamatum. Stipes usque 9 cm. longus nitidus fusco-purpurascens 1 mm. in diametro sectionis gracillimus glaber basi  $\pm$  squamatus. Frons lanceolata apice acuminatissima (acumine lineari) a medio usque ad basi æquilata basi subtruncata usque ad 17 cm. longa usque ad  $2\frac{1}{2}$  cm. lata pinnata, pinnis mediis inferioribus subæquilongis, superioribus minoribus versus apicem ad dentem brevem abeuntibus, pinnis inferioribus a se 8 mm. remotis angulo  $50^\circ$  a rachibus frondium divaricatis oblique rectangularibus  $1\frac{1}{2}$  cm. longis 4 mm. latis versus apicem obtuso-acutis ad summum obtusis  $\pm$  ascendentibus basi acuto-cuneatis subsessilibus vel brevissime petiolatis valde inæquilateralibus, latere superiore basi 6 mm. lato, latere inferiore subnullo, margine superiore obscure crenatis margine inferiore subintegris; pagina utraque glabra tenuissime membranacea semihyalina. Sori a medio frondis sursum dispositi.

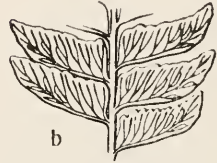


Fig. 160-B, b,  
a portion of the frond.

HAB. Arisan, ad 7000 ped. alt., leg. B. HAYATA et S. SASAKI, Jan., 1912.

This fern is of a form so strikingly different from ordinary one of the type. But, the transition from this extreme form to the ordinary one has led me to regard the former as a variety of the latter, or more likely as a mere form of the same species.

**Asplenium viridissimum** HAYATA sp. nov. (Fig. 161). Rhizoma? Stipes 40 cm. longus basi parce squamatus purpureo-viridescens superne glabratus subviridescens, squamis angusto-linearibus 13 mm. longis  $1\frac{1}{2}$  mm. latis vel valde minoribus et piliformibus. Frons lanceolata 70 cm. longa 35 cm. lata apice acuta vel acuminata basi in ambitu rotundata tripinnatifida, pinnis inferioribus longissimis, infimis plus minus brevioribus, superioribus gradatim minoribus, pinnis longissimis pyramidal-lanceolatis 20 cm. longis 8 cm. latis obliquis (latere superiore latiore basi 6 cm. lato, latere inferiore minus lato 4 cm. lato) basi 10 cm. latis apice acuminatis (acuminibus pinnarum linearibus dentatis), pinnis infimis  $5\frac{1}{2}$  cm. longis 3 cm. latis apice obtuso-acutis pinnatis vel pinnatifidis pyramidalibus basi latis-simis petiolulatis (petiolulis 3 mm. longis), pinnullis ordinis primarii utroque latere pinnae inferioris 6-7, infimis ovatis 18 mm. longis 10 mm.



Fig. 161, *Asplenium viridissimum* HAYATA; a, the plant; b, a scale on the stipe; c, a hair-like scale on the stipe; d, a pinnule; e, apical portion of the same.

latis apice obtusis basi acuto-cuneatis ad petiolulum 2 mm. longum abeuntibus margine simpliciter vel duplicato dentato-lobulatis, lobulis acutis; textura herbacea, pagina supra viridissima subtus minus viridi. Sori sub lobulis pinnularum primariarum vel secundariarum singuli oblongi  $2\frac{1}{2}$  mm. longi. Pinnæ mediæ et superiores a rhachibus frondium angulo  $50^{\circ}$  divaricatæ; pinnæ inferiores a rhachibus frondis angulo  $90^{\circ}$  divaricatæ. Rhachis frondis complanato-teres supra anguste subalata; rhachis pinnarum præsertim superiorum et pinnularum distincte alata, cum alis  $1\frac{1}{2}$  mm. lata; costis mediis rhachiarum tenuibus utroque distincte elevatis, costulis pinnularum supra distincte subtus obscure elevatis.

HAB. Arisau, leg. B. HAYATA et S. SASAKI, Jan., 1912.

Near *Asplenium Mertensianum* KZE., but differs from it by the much broader fertile pinnules. Also near *Asp. affine* Sw., but distinguishable from it in having much larger tripinnate fronds of herbaceous texture.

***Asplenium Wrightii* EAT. var. *aristato-serrulatum* HAYATA n. v.** (Fig. 162). Rhizoma? Stipes 15 cm. longus  $2\frac{1}{2}$  mm. in diametro castaneo-nigrescens glaberrimus. Frons in ambitu ovato-lanceolata 50 cm. longa 25 cm. lata apice caudato-acuminata basi in ambitu acuta pinnata, pinna terminali lineari acuto-uncinato-dentata 7 cm. longa acuminata, pinnis lateralibus inferioribus

longissimis lanceolato-linearibus 14-15 cm. longis basi 13 mm. latis apice acuminato-linearibus basi latissimis subito cuneato-acutis ad petiolum 5 mm. longum abeuntibus margine duplicato-serratis, serris apice uncinato-recurvatis, pinnis mediis a se  $2\frac{1}{2}$ -3 cm. remotis, petiolis alatis. Textura herbacea, pagina viridissima, costis et venis utraque pagine elevatis, venis tenuissimis subfurcatis; rhachis supra sulcata nigro-castanea glabra inferiore non alata superiore alata cum alis  $2\frac{1}{2}$  mm. lata. Sori lineares a prope costas usque ad sinus serrarum extensi utroque latere costae uniseriatim approximatis basi pinnae usque ad apicem dispositi.

HAB. Uraí, leg. B. HAYATA, Juli., 1912.

Differs from the type (MAKINO Phanerog. et Pterid. I. t. 5) by the more sharp uncinuate teeth curving downwards, more closely arranged sori, and by the much thicker texture. Also near *Asp. contiguum* KLF., but quite distinguishable by the sori reaching nearly to the margin.

***Athyrium* ROTH.**

***Athyrium erythropodum***

HAYATA sp. nov. (Fig. 163). Rhizoma? Stipes 40 cm. longus gracilis 2 mm. in diametro basi parce squamatus laud nitidus leviter albo-purpurascens. Frons ovato-triangularis 30 cm. longa 23 cm. lata apice tenuissime cuspidato-acuminata basi latissima subtruncata bipinnata, pinnis inferioribus a se 4 cm. remotis angulo  $50^\circ$  a rhachibus egressis, pinnis mediis longissimis triangulari-lanceolatis 15 cm. longis 5 cm. latis apice lineari-acuminatis tenuissimis (acuminibus linearibus versus summum subsubulatis) basi petiolatis (petiolis 5 mm. longis), pinnulis infimis triangulari-oblongis 3 cm. longis basi 7 mm. latis



Fig. 162, *Asplenium Wrightii* EAT. var. *aristato-serrulatum* HAYATA; a, the plant; b, a pinna.



Fig. 163, *Athyrium erythropodum* HAYATA;  
a, the plant; b, a scale on the stipe; c, a pinule; d, a sorus of the *Athyrium*-type.

apice acutis basi late acutis vel rotundatis petiolulatis (petiolulis 3 mm. longis), pinnatifidis, segmentis infimis oblongis 8 mm. longis 3 mm. latis apice apiculato-acutis basi

cuneatis contractis. Textura herbacea. Sori utroque latere secus costulas segmentorum 1-seriatim dispositi semi-oblongi recurvati.

HAB. Monte Arisan, leg. B. HAYATA et S. SASAKI, Jan., 1912.

Near *Athyrium macrocarpum* (BL.).

***Athyrium reflexipinnum***

HAYATA sp. nov. (Fig. 164).

Rhizoma erectum longiusculum cum reliquis stipitum 1 cm. in diametro. Stipes caespitosus usque 5 cm. longus stramineus basi squamatus sursum glaber, squamis lineari-lanceolatis usque 7 mm. longis  $\frac{2}{3}$  mm. latis apice subulatis basi latissimis truncatis fuscentibus. Frons lanceolata vel ovato-lanceolata 11 cm. longa  $3\frac{1}{2}$  cm. lata apice acuminatissima (acumine lineari) basi in ambitu obtusa pinnata, pinnis patentibus superioribus a rhachibus  $50^{\circ}$ – $60^{\circ}$  egressis, mediis horizontaliter

patentibus, inferioribus desuper reflexis, mediis longissimis, infimis brevioribus, superioribus brevioribus versus summum ad dentem acuminis reductis, mediis a se 1 cm. remotis triangulari-lanceolatis 2 cm. longis 12 mm. latis apice acutis basi truncatis sessilibus basi latere superiore latioribus



quam latere inferiore, pinnatifidis vel pinnatilobis, lobis infimis (latere superiore) ovatis 5 mm. longis 3 mm. latis apice in ambitu obtusis basi plus minus contractis margine ascendento-dentatis apice tri-dentatis, dentibus triangularibus acutis  $\frac{1}{2}$  mm. longis; rachis pinnarum basi supra lobos infimos 1 mm. lata, costis pinnarum supra  $\pm$  canaliculatis sub-

tus  $\pm$  elevatis; textura herbacea. Sori secus costas pinnarum vel secus costulas lorum pinnarum utroque latere 1-seriatim dispositi semi-oblongi plus minus recurvi vel semi-orbiculares. Indusium breve subcordatum vel recurvato-lunulare.

HAB. In monte Morrison, leg. S. SASAKI et T. KAWAKAMI, Oct., 1909.

**Athyrium tozanense** HAYATA n. n.



Fig. 164, *Athyrium reflexipinnum* HAYATA; a, the plant; b, a scale; c, a pinna; d, a sori of the *Dryopteris*-type; e, another one of the *Athyrium*-type.

*Asplenium tozanense* HAYATA Mater. Fl. Formos. p. 440.

HAB. Arisan, leg. B. HAYATA et S. Sasaki, 1912, Jan.

***Blechnum* LINN.**

***Blechnum integripinnulum* HAYATA sp. nov.** (Fig. 165). Rhizoma erectum ascendens reliquis stipitum obtectum teres cum reliquis stipitum



Fig. 165, *Blechnum integripinnulum* HAYATA; a, the plant; b, a scale on the rhizome; c, a pinna of a sterile frond; d, a portion of the same; e, a pinna of a fertile frond; f, a portion of the same (upper surface); g, the same (under surface); h, cross section of a pinnule of a fertile frond. a =  $\times \frac{10}{41}$ ; c and e, natural size; others more or less magnified.

1½ cm. in diametro plus quam 15 cm. longum persimiliter supra terram erectum (supraterraneum) apice frondes steriles et fertilesque profuse emittens. Frons sterilis: stipes brevis 3-4 cm. longus squamis dense obtectus, squamis linearibus 1 cm. longis basi 1 mm. latis apice acuminatis filiformibus basi obscure peltatis margine integris; frons obovato-lanceolata 20-25 cm. longa 10 cm. lata recto-patens pinnata vel pinnatifida apice acuta vel acuminata basi subito attenuata ad stipitem brevem abeuns, pinnis mediis longissimis lineari-lanceolatis 6 cm. longis 12 mm. latis apice acuminatis basi ± contractis a se 1½ cm. remotis ad rhachin pinnatifidis, segmentis mediis oblique lineari-triangularibus 7 mm. longis 2½ mm. latis apice subito acutis vel obliquis margine integris; rhachibus pinnarum subalatis, alis irregulariter oblique inciso-fidis, segmentis alæ iis pinnarum æquantibus; pinnis infimis subito ad pinnam auriculiformem reductis, auriculis oppositis vel alternis gradatim minoribus a se 6-7 mm. remotis, superioribus angustato-quadrangularibus 7 mm. longis 3 mm. latis basi dilatatis apice obtusis a rhachibus frondium angulo recto divaricatis; pinnis superioribus angulo 50° divaricatis, inferioribus angulo recto egressis; textura subcoriacea pagina glabra, rhachibus costulisque utraque pagine elevatis toto glabris. Frons fertilis: fronde sterili subæquilonga ± angustiore lanceolata 6 cm. lata pinnata, pinnis a se 1 cm. remotis lanceolatis, mediis 3 cm. longis 7 mm. latis apice longe caudatis, caudis linearibus 1 cm. longis 2 mm. latis apice obtusis, basi ± petiolulatis, inferioribus gradatim minoribus, pinnatifidis, segmentis linearibus 6 mm. longis 1-2 mm. latis, subtus toto longitudine soriferis; rhachis frondis angustissime alata.

HAB. Taitō: leg. T. KAWAKAMI, 1910, Aprili. (No. 4902).

Quite near *B. Fraseri* LUERSS. and its variety *philippinense*; but distinctly differs from them by the smaller fronds with entire pinnules. The occurrence of this group of the genus in Formosa is very interesting. There are in all two species and a variety; one species exists in Newzealand, a variety of the same species in the Philippines and the other, the present one, in Formosa.

#### *Coniogramme* FÉE.

**Coniogramme parvipinnula** HAYATA sp. nov. (Fig. 166). Rhizoma? Stipes 40-50 cm. longus subglaber stramineus. Frons ovata vel ovato-triangularis 60 cm. longa 40 cm. lata apice triangulari-acuta basi in ambitu late obtusa

bipinnata, pinnis inferioribus longissimis superioribus minoribus sursum ad pinnas simplices lanceolatas reductis, pinnis inferioribus petiolatis (petiolis 3-4 cm. longis) a se 13 cm. remotis pinnatis utroque latere rhachis frondis 6-7; pinnis superioribus simplicibus (i.e. non pinnatis) utroque latere 8; pinnis inferioribus pinnatis lanceolatis 30 cm. longis basi latissimis [basi 16 cm. latis apice cuspidato-acuminatis basi truncatis,

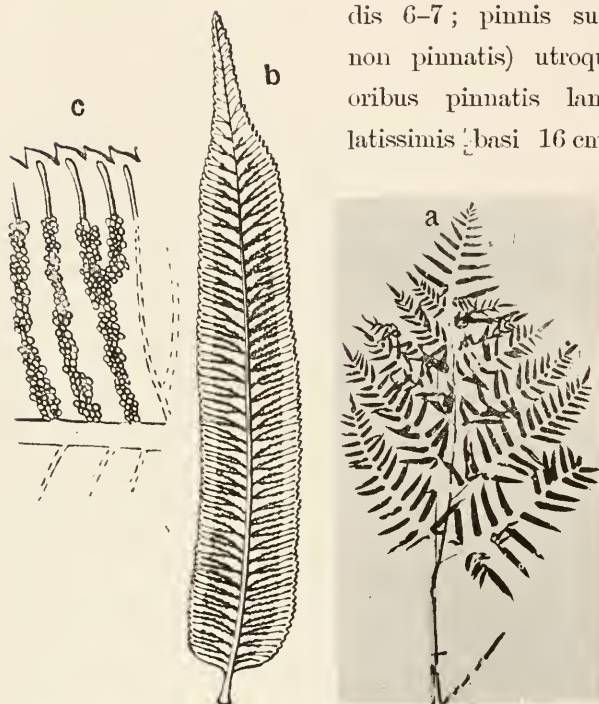


Fig. 166, *Coniogramme parvipinnula* HAYATA; a, the plant; b, a pinnule; c, a portion of the same.

pinnulis utroque latere rhachis pinnae 14, pinnula terminali lanceolata iis superioribus lateralibus majore, pinnulis infimis maximis lineari-lanceolatis 9 cm. longis 12 mm. latis apice lineari-recto-acuminatis basi truncatis margine minute regulariter denticulato-serrulatis, partibus basilaribus truncatis integris petiolulatis, petiolulis 1 cm. longis; pinnulis

superioribus vel pinnis superioribus minoribus lanceolatis sessilibus 27 mm. longis 6 mm. latis; pinnis a rhachibus frondium angulo  $45^{\circ}$ , pinnulis a rhachibus pinnarum angulo  $80^{\circ}$ - $90^{\circ}$  egressis; venis toto liberis furcatis, ramis ad prope apicem serrularum attingentibus, ramis ad apicem clavatis. Textura herbaceo-membranacea. Sori lineares a costa usque ad  $\frac{2}{3}$  secus venas extensi. Indusium nullum.

HAB. Arisan, leg. B. HAYATA et S. SASAKI, Jan., 1912.

I have much hesitated to describe this fern as a species distinct from *C. fraxinea* FÉE. In general appearance, the former greatly differs from the latter in having bipinnate fronds with far much smaller pinnules. In close examination, however, the pinnae and pinnules of our fern show many tran-



sitional forms from smaller to larger ones in one and the same specimen. Further study in the field and exhaustive comparison with rich materials will prove that this is a compound form of *C. fraxinea* FÉE.

***Hypolepis* BERNH.**

***Hypolepis tenuifolia* BERNH.** COPELAND Polyp. Philipp., p. 95; DIELS Natür. Pfl.-fam. Pterid. p. 278, fig. 147-A.

HAB. Kōshūn, Mt. Hieranzan, leg. B. HAYATA et S. SASAKI, Juni., 1912.

***Plagiogyria* METT.**

***Plagiogyria adnata* BEDD.** Fern. Brit. Ind. t. 51.

HAB. Shinkō: Shibaraku, leg. U. MORI, Juli., 1906.

Compared with a Japanese specimen so labelled in the Tōkyō herbarium. Pinnæ of the fertile frond are more straight, (not crispate) longer and stronger, than those of the Japanese specimen. Perhaps a variety of the type.

***Plagiogyria euphlebia* METT.** HAYATA Mater. Fl. Formos. p. 443.

HAB. Arisan, ad 7000 ped. alt., leg. B. HAYATA et S. SASAKI, Jan., 1912.

***Plagiogyria falcata* COPEL.** in Philip. Journ. Sci. Bot. II.-2. p. 133, t. I.-B. *Plagiogyria Hayateana* MAKINO in Tōkyō Bot. Mag. XX. p. 245. *Plagiogyria Matsumuræ* HAYATA (non MAKINO) Fl. Mont. Formos. p. 244.

HAB. Arisan, ad 8000-7000 ped. alt., leg. B. HAYATA et S. SASAKI, 1912, Jan.

***Plagiogyria stenoptera* DIELS.**

HAB. Arisan, ad 8000-7000 ped. alt., leg. B. HAYATA et S. SASAKI, Jan. 1912.

Compared with a specimen so labelled in the herbarium at Tōkyō.

***Pteris* LINN.**

***Pteris dactylina* HOOK.** Sp. Fil. II. p. 160 t. 130-A; HOOKER et BAKER Syn. Fil. p. 155; BEDD. Handb. Fer. Brit. Ind. p. 108 fig. no 56 et Fern. Brit. Ind. t. 23.

HAB. Taitō: Chakankei, leg. U. MORI.

DISTRIB. Nepal to Sikkim and Khasya, ascending to 9000 ft.

***Pteris excelsissima* HAYATA** sp. nov. (Fig. 167). Rhizoma? Stipes 150 cm. longus glaberrimus basi castaneo-ferrugineus superiore intus stramineus intus profunde sulcatus validissimus basi 2 cm. in diametro sectionis. Frons



Fig. 167, *Pteris excelsissima* HAYATA: a, the plant; b, a young specimen; c, a pinnule of the plant; d, a portion of the same.

in ambitu late ovata 130 cm. longa 90–100 cm. lata apice in ambitu late triangulari-acuta bi-tripinnatifida glaberrima subcoriacea vel membranaceo-coriacea, pinnis utroque latere 9 mediis a se 12 cm. remotis lineari-lanceolatis pinnatifidis, pinnis infimis a rhachibus frondium angulo  $50^{\circ}$  divaricatis longissimis (interdum 2-partitis 60 cm. longis 18 cm. latis lanceolatis subsessilibus ad rhachin pinnatifidis, segmento terminali longissimo lineari 14 cm. longo 1 cm. lato apice longe acuminato basi æquilato margine integro, segmentis juxta terminalem et infimis brevissimis 3 cm. longis 1 cm. latis triangulari-acutis, pinnulis mediis longioribus 10 cm. longis 1 cm.

latis apice acuminatis basi decurrento-dilatatis 22 mm. latis cum iis proximalis continuis (sinibus inter segmenta obtusis 13 mm. latis) margine integris; pinna terminali 20 cm. longa cuspidato-ovata 10 cm. lata ad rhachin pinnatifida,

segmento terminali longe lineari 10 cm. longo; pinnis juxta terminalem 16 cm. longis; textura membranaceo-subcoriacea; pagina margine sorifera integra, sed prope apicem non sorifera minute crenata. Rhachis pinnarum supra profunde sulcata utroque latere sulcorum 1-lamellata et remote setulosa, setulis 2 mm. longis latere complanatis a se 1-1½ cm. remotis; costa vel costula segmenti supra impressa glabra subtus elevata, venis lateralibus liberis plerumque duplicato-furcatis (venis a basi furcatis, ramis venarum furcatis). Sori marginales a prope basin segmentorum usque ad supra medium extensi, ab apice segmentorum 1 cm. distantes.

HAB. Arisan, fere 7-6000 ped. alt., leg. B. HAYATA et S. SASAKI, 1912, Jan.

Very near *Pteris excelsa* GAUD. (HOOK. Sp. Fil. II. p. 183 t. 136; BEDD. Fern. Brit. Ind. t. 218; and Herb. Corean. tested by Dr. T. NAKAI); but ours is different from that in having pinnules or segments with broader base and very much more acuminate linear apex. It should be better regarded as a variety of the same species and should be named *P. excelsa* var. *excelsissima*.

***Pteris pellucida* PR.**

HAB. Arisan, leg. B. HAYATA et S. SASAKI, Jan., 1912.

Formosan specimen is considerably different from the named species by the much narrower pinnae of the fertile and sterile fronds, as far as I can draw from the descriptions given in HOOK. BAK. Sy. Fil. and HOOK. Sp. Fil. In the Philippine specimens, there is a fern labelled *P. pellucida* which is exactly identical with our fern. I conject that this *Pteris* may vary a very wide range. At present, I am merely following the Philippine plant to take this name for our fern. The description in HOOK. et BAKER Syn. Fil. p. 154. shows that the fern has often lower pinnae 8 in long 1 in. broad. The figure given in HOOKER Sp. Fil. II. t. 126-B shows also a form with broader fronds than those of ours.

***Pteris setuloso-costulata* HAYATA sp. nov. (Fig. 168).** Rhizoma? Stipes 30-40 cm. longus 3 mm. latus stramineus glaber. Frons oblongo-lanceolata 60 cm. longa 30 cm. lata apice triangulari-acuta pinnata vel bipinnata in partibus infimis, pinnis suboppositis inferioribus a se 4-8 cm. remotis a rhachibus angulo 60° egressis, pinnis infimis magnis 18 cm. longis semitriangularibus basi 14 cm.

latis latere inferiore pinnulis 3-4 gerentibus latere superiore haud pinnuliferis subsessilibus vel breve petiolatis, pinnulis infimis a rhachibus pinnarum angulo  $70^{\circ}$ - $90^{\circ}$  divaricatis sessilibus late linearibus 13 cm. longis  $2\frac{1}{2}$  cm. latis



Fig. 168, *Pteris setulosocostulata* HAYATA;  
a, the plant; b, a portion of a pinnule; c, setules  
on the costa.

basi truncatis ad apicem subito acutis ad acumina abeuntibus (acuminibus linearibus 2 cm. longis 3 mm. latis margine crenulatis ad summum acutis) ad rhachin pinnatifidis, segmentis alternis linearibus a rhachibus pinnularum angulo  $80^{\circ}$  divaricatis 15 mm. longis  $3\frac{1}{2}$  mm. latis apice rotundato-obtusis basi plus minus dilatatis 5

mm. latis ad basin se continuis approximatis margine integris nervo-marginatis. Textura chartacea supra glabra, costulis utraque pagine elevatis venis venulisque liberis a basi vel a medio furcatis, venulis ad marginem attingentibus supra subglabris subtus parcissime minuteque sub lente glanduloso-pilosis; costulis pinnarum utraque elevatis supra profunde sulcatis, utroque latere sulcorum anguste lamellatis,

lamellis remote minute setulosis, setulis acutis complanatis, segmentis margine toto latere (excepto basi apiceque) soriferis.

HAB. Mt. Morrison, ad 6000 ped. alt., leg. U. MORI, 1909, (No. 1867); Mt. Arisan, leg. B. HAYATA et S. SASAKI, Jan., 1912.

Near *Pteris biaurita* LINN. (HOOKER et GREY. Ic. Fil. t. 142), but differs from it by the lowest pinnæ, which are not bipartite, but have 2-3-pinnules on the lower side. This is still nearer *Pteris quadriaurita* var. *setigera* (Hook.) (BEDD. Fern. Brit. Ind. t. 202), which has setulose rhachis like that of the present fern.

### ***Pteris tripartita* Sw.**

HAB. Taitō: Nanrio, leg. G. NAKAHARA, Jan., 1906, (No. 703).



Compared with a specimen from the Philippines.

*Vittaria* SM.

***Vittaria arisanensis* HAYATA sp. nov. (Fig. 169).**

Epiphytica. Rhizoma tenue dense squamatum, squamis tenuibus linearibus 10 mm. longis  $\frac{1}{2}$  mm. latis apice acuminatis. Stipes subnullus. Frons linearis 50–60 cm. longa 8–9 mm. lata apice acuminata attenuata ad stipitem subnullum abeuns integra utraque glabra non squamata chartacea, costis supra non visis subtus fere distinctis sed non elevatis, margine subplana leviter recurvata vel non recurvata; venis lateralibus liberis laxissime dispositi. Sori a margine 1–1 $\frac{1}{2}$  mm. distantes.

HAB. Mt. Arisan, leg. B. HAYATA et S. SASAKI, 1912, Jan. Differs from *V. lineata* by the much larger fronds and by the sori which are not wrapped by the margin.

***Vittaria* sp.**

A very slender fern resembling *V. lineata* (LOWE Ex. Fer. Vol. II. t. 65–A; EAT. Fern. North Americ. t. 38). No fructification.

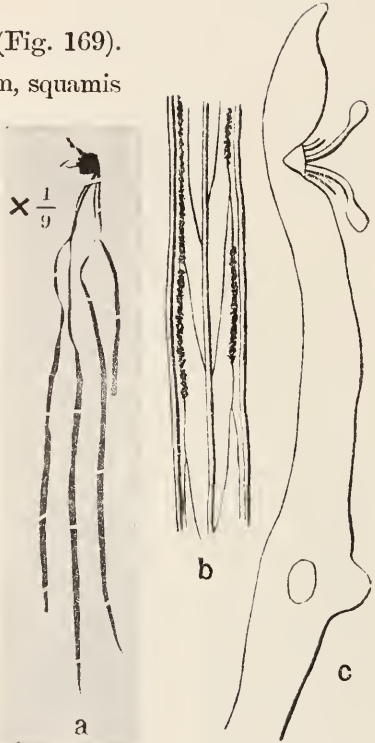


Fig. 169, *Vittaria arisanensis* HAYATA; a, the plant; b, a portion of the frond (underside); c, a portion of cross section of the frond.

*Polypodium* LINN.

***Polypodium arisanense* HAYATA sp. nov. (Fig. 170).** Epiphytica. Rhizoma repens complanato-teres 4 mm. in diametro sectionis ad insertionem stipitum valde elevatum (partibus elevatis 2 mm. longis) squamis dense obtectum, squamis cuspidato-triangularibus apice lineari-cuspidatis basi subtus latis-  
simis 1 $\frac{1}{2}$  mm. latis 3 mm. longis basi alte cordatis vel auriculato-cordatis, (auriculis cordum  $\frac{1}{2}$  mm. longis subimbricatis basi 2-lobatis, lobis triangularibus margine remote denticulatis), supra insertionem pilis longiusculis 1 mm. longis 5–6 instructis castaneis. Stipes intus sulcatus stramineus extus rotundatus castaneus semiteres 2 mm. in diametro 10 cm. longus gracillimus glaber hand



Fig. 170, *Polypodium arisanense* HAYATA; b, a scale on the rhizome; c, a portion of a pinna.

vel rotundatis a rhachibus frondium  $80^{\circ}$  egressis, segmentis inferioribus gradatim longioribus, segmentis infra medium longissimis a rhachibus frondium circ.  $90^{\circ}$  egressis 55 mm. longis 10 mm. latis linearibus apice acuminatis ad summum obtusis basi latissimis dilatatis, sinibus inter segmentorum obtusis apice a costa rhachis frondis 3 mm. distantibus, segmentis infimis desuper

squamatus. Frons caudato-ovato-lanceolata pinnatifida 26 cm. longa 10 cm. lata apice longe caudata, pinna vel segmento terminali longissimo lineari 8 cm. longo 8 mm. lato apice linear-acuminato ad summum obtuso basi laud contracto tenuiter serrulato, serrulis obtusis ascendentibus brevissimis approximatis 2 mm. a se distantibus latere inferiore 2 mm. longis costa cum costa parallelis latere superiore  $\frac{1}{3}$ - $\frac{1}{4}$  mm. longis, areolis costalibus subrectangularibus 3 mm. longis totiusque latis venulas liberas singulas includentibus, venulis liberis soro terminatis; segmentis vel pinnis lateralibus juxta pinnam terminalem brevissimis triangulari-oblongis circ. 8 mm. longis 5 mm. latis apice obtusis

reflexis brevioribus  $4\frac{1}{2}$  cm. longis; costis segmentorum supra plano-elevatis, subtus acuto-elevatis; areolis costalibus secus rhachin frondis linearibus mediis  $1\frac{1}{2}$  cm. longis  $1\frac{1}{2}$  mm. latis; costis venis venulisque utraque pagine distincte nigro-coloratis; pagina supra glabra subtus ad costas venasque sub lente minute parcellissime squamata vel demum glabrata. Textura membranacea. Sori dorso ad paginam superiorem elevati, partibus elevatis rotundatis medio umbonato-impressis.

HAB. Arisan, ad 8000–7000 ped. alt., leg. B. HAYATA et S. SASAKI, Jan., 1912.

Near *Polypodium formosanum* BAKER, but differs from it by the more acuminate pinnae which are more or less ascending, but not quite horizontally arranged like those of *P. formosanum*. Also near *P. amœnum* WALL. = *Goniophlebium amœnum* J. SM. (BEDD. Fern. Brit. Ind. t. 5), but distinguishable from it by the quite naked fronds with much longer linear terminal lobes.

**Polypodium decrescens** CHRIST (Fig. 171) var. **blechnifrons** n. v. Rhizoma repens teres tenue minus 1 mm. crassum dense squamatum dense radicans dense foliosum, squamis fusco-castaneis tenuissimis lanceolatis 4 mm. longis  $\frac{3}{4}$  mm. latis apice acuminatis basi rotundatis subcordatis non peltatis. Stipes brevis usque 1 cm. longus semiteres supra (intus) planus densiuscule pilis horizontaliter patentibus obtectus, pilis 1-seriatim pluricellularibus castaneo-rubrescentibus  $1\frac{1}{2}$  mm. longis apice clavatis, præterea pilis brevissimis 2-cellularibus apice clavatis latioribus parce dispersus. Frons lanceolata vel oblongo-lanceolata 13 cm. longa 3 cm. lata apice acuta vel caudato-acuminata (caudis linearibus  $2\frac{1}{2}$  cm. longis  $2\frac{1}{2}$  mm. latis ad summum obtusis) vel ecaudata simpliciter acuta basi subito cuneata attenuata lineari-attenuata ad stipitem 1 cm. longum abeuns, (partibus attenuatis  $4\frac{1}{2}$  cm. longis sursum 1 cm. latis deorsum  $1\frac{1}{2}$ –1 mm. latis margine undulato-repandis, undulis gradatim minoribus demum ad nullum abeuntibus, undulis superioribus triangularibus 4 mm. latis 2 mm. longis apice obtuso-rotundatis), partibus principalibus (partibus frondis exceptis partibus attenuatis et caudis) toto circ. ad rhachin pinnatifidis, segmentis linearibus rectis circ. angulo  $50^{\circ}$ – $60^{\circ}$  a rhachibus frondis egressis versus apicem angustioribus ad summum obtusis deorsum latioribus ad basin plus minus dilatatis, mediis 13 mm. longis basi 3–4 mm. latis a se (a



Fig. 171, *Polypodium decrescens* CHRIST var. *blechnifrons* HAYATA; a, the plant; b, a scale on the rhizome; c, a glandular hair on the stipe; d, hairs on the stipe; e, apex of one of the same hairs; f, basal portion of the same; g, a portion of the frond.

marginē ad marginem) 3 mm. remotis marginē integerrimis plus minus desuper recurvis, sinibus inter segmentos linearibus apice obtuso-rotundatis. Textura crassiuscula tenuiter coriacea, pagina subtus subplana parcissime pilis brevissimis glanduliferis dispersa supra subglabra secus sulcis costarum remotissime paucissime barbis dispersa; rhachibus frondium supra sulcato-impressis, costulis segmentorum supra non visis tenuiter impressis.



Sori utroque latere costæ 1-seriatim suboppositim dispositi, a se 2-3 mm. remoti oblongo-rotundati  $1\frac{1}{3}$  mm. longi.

HAB. Arisan, inter Funkiko et Taroyen, ad 6000 ped. alt., leg. B. HAYATA et S. SASAKI, Jan., 1912.

Very near the type which is known to exist in Celebes and the Philippines. I have not seen either the authentic specimen or original description. So far as is concerned a specimen from the Philippines labelled "*Polypodium decrescens* CHRIST, teste CHRIST, Bagnen, Lepanto, Luzon, 6500 ft. Nov. 1905, No. 1916," and figures given in the Philip. Journ. Sc. I. Supp. II. t. 17, the present fern is slightly different from the type in having broader fronds and longer stipes. This new variety is somewhat near *P. obliquatum* DRUDE, but quite distinguishable from it in having linear obtuse pinnæ arranged in a much acuter angle and by the elevated (not immersed) rounded sori. It is also near *Polypodium Thwaitesii* BEDD. (Handb. Fern. Brit. Ind. p. 310, fig. 164 and Fern. Brit. Ind. t. 188.),

*P. repandulum* METT. (BEDD. Handb. Fern. Brit. Ind. p. 313, fig. 167) and *P. subfalcatum* BL. (BEDD. Fern. Brit. Ind. tt. 76 et 189), but differs from all of them and especially from the last one by the entire pinnæ or lobes of the fronds.

**Polypodium  
falcatopinnatum** HAYATA sp.  
nov. (Fig. 172).

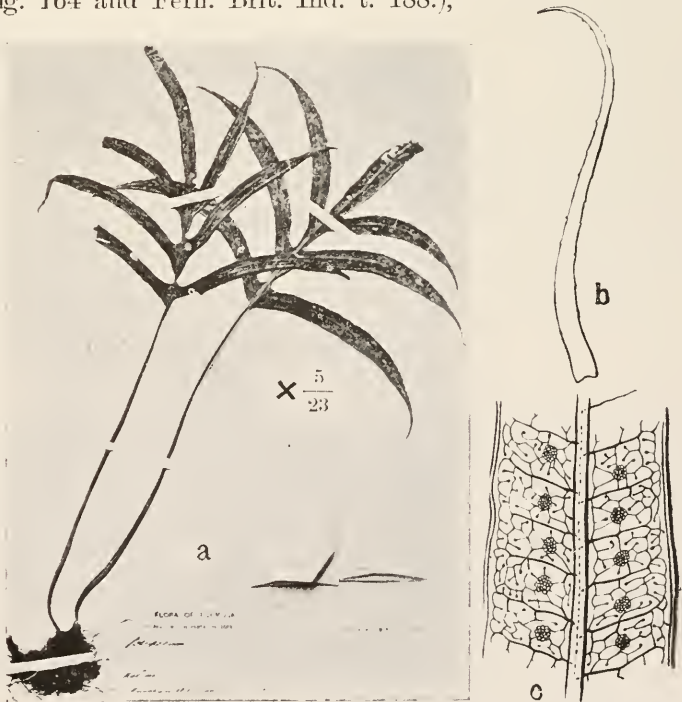


Fig. 172, *Polypodium falcatopinnatum* HAYATA; a, the plant; b, a scale on the rhizome; c, a portion of the frond.

Rhizoma repens teres 4–5 mm. in diametro squamis dense obtectum, squamis valde adpressis ovato-cuspidatis 2–3 mm. longis. Stipes 20–25 cm. longus glaberrimus esquamatus intus (supra) profunde sulcatus stramineus. Frons late triangularis stipitem in longitudine subæquans vel eo brevior 20 cm. longa 25 cm. lata pinnatifida, pinna terminali lineari 15 cm. longa apice longe acuminatissima 15 mm. lata margine plana undulato-crenata vel subintegra, pinnis lateralibus pinna terminali conformibus æquilongis falcato-recurvis apice acuminatis (acuminibus linearibus desuper falcatis) utroque latere rhachis frondis 3–4 suboppositis basi longe decurrentibus fere ad rhachin attingentibus 2 cm. a se remotis, sinibus inter pinnas latis rotundatis, costis et costulis supra subelevatis distincte sulcatis, pinnis a costa angulo 60° divaricatis patentibus, venis lateralibus utraque pagine elevatis tenuibus a costula angulo 70° divaricatis. Sori utroque latere costæ pinnæ uniseriatim dispositi inter venas solitarii.

HAB. Kōtōshō : leg. T. KAWAKAMI et S. SASAKI, Juli., 1912, (No. 5).

Near *P. palmatum* BLUME, but differs from it by the pinnæ curving downwards.

**Polypodium gracillimum** COPEL.

*Polypodium cucullatum* HAYATA Mater. Fl. Formos. p. 445 (Non NEES).

Compared with a specimen from the Philippines labelled "*P. gracillimum* COPEL. Mt. Apo, Mindaneo, alt. 6000 ft. Oct. 1904, No. 1526."

**Polypodium lineare** THUNB. var. **monilisorum** HAYATA n. v. (Fig. 173). Rhizoma repens gracile 1–1½ mm. crassum, squamis dense obtectum, squamis rubro-castaneis ovato-lanceolatis 2½ mm. longis ⅔ mm. latis apice acuminatis basi latissimis ovatis peltatis basi rotundatis vel plus minus angulatis a basi usque ad insertionem ½ mm. longis margine remote obscure denticulatis vel subintegris medio rubro-maculatis, maculis ovato-lanceolatis. Stipes circ. 1 cm. longus glaber. Frons linearis curva 15 cm. longa 3–4 mm. lata apice lineari-acuminata basi gradatim attenuata ad stipitem brevem abeuns in exsiccatō inter soros plus minus moniliforme constricta supra glabra subtus secus costas squamis remote parceque dispersa vel glabrata supra in exsiccatō pallido-viridis subtus pallidissima plus minus flavescens, costis utraque pagine elevatis. Textura tenuiter coriacea. Sori infra acumen 2 cm. longum 2 mm.



Fig. 173, *Polypodium lineare* THUNB. var. *monilisorum* HAYATA; a, the plant; b, a scale on the rhizome; c, a portion of the frond; d, a paraphysis.

latum frondis deorsum usque ad 3–4 cm. dispositi utroque latere costæ 1-seriatim dispositi suboppositi elliptico-rotundati  $3\frac{1}{2}$  mm. longi  $2\frac{1}{2}$  mm. lati longiores quam latiores inferiores a se 4 mm. remotis; paraphysis paucissimis peltatis rotundatis margine denticulatis.

HAB. Monte Arisan, leg. B. HAYATA et S. SASAKI, Jan., 1912.

Differs from the type by the roundly peltate paraphysis of the sori, much narrower and less coriaceous frond and especially by the soriferous parts of the fronds which are moniliformly contracted when dried.

***Polypodium Meyenianum*** (SCHOTT), HOOK.; MATSUM. et HAYATA Enum. Pl. Formos. p. 634.

HAB. Hieranzan, prope Kujukusu, leg. B. HAYATA et S. SASAKI, Juni., 1912.

**Polypodium morrisonense** HAYATA Mater. Fl. Formos. p. 447.

Near *Pleopeltis hemionitidea* MOORE. = *Polypodium hemionitideum* WALL., but differs from it by the thin membranaceous texture.

**Polypodium pellucidifolium** HAYATA sp. nov. (Fig. 174). Rhizoma repens teres squamis patentibus dense obtectum 3-4 mm. in diametro, squamis

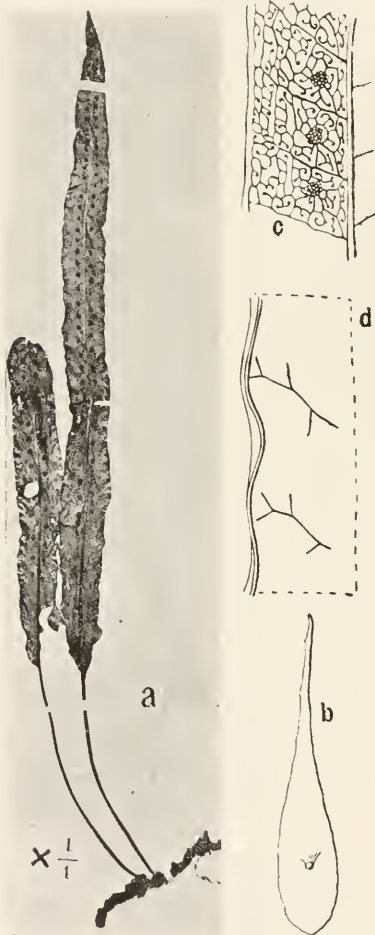


Fig. 174, *Polypodium pellucidifolium* HAYATA; a, the plant; b, a scale on the rhizome; c, a portion of the frond; d, margin of the same.

ovato-lanceolatis peltatis apice cuspidatis basi rotundatis castaneis. Stipes 10-9 cm. longus glaber intus (supra) profunde sulcatus. Frons linearis 35 cm. longa 22 mm. lata apice acuta basi acuta vel cuneato-acuta margine integra vel crispato-undulata plus minus tenuiter desuper recurva vel plana supra nitida, costa supra profunde sulcata subtus prominente elevata, venis lateralibus subrectis a costa angulo 65° egressis supra nigro-coloratis leviter flexuosis valde distinctis subtus tenuiter elevatis prope marginem evanescentibus, reticulis venularum supra visis; textura tenuiter coriacea pellucida. Sori uniseriatim a infra medium usque ad apicem frondis dispositi, inter venas laterales solitarii.

HAB. Arisan, leg. B. HAYATA et S. SASAKI, Jan., 1912.

Near *P. Engleri*, but differs from it by the shining semi-transparent larger fronds with distinct veins.

**Polypodium obtusifrons** HAYATA n. sp. (Fig. 175). Rhizoma repens teres 2 mm. crassum squamis dense obtectum, squamis castaneis cuspidato-rotundatis 2 mm. longis 1 mm. latis apice obtuse lateque cuspidatis basi dilatatis rotundatis profunde cordatis,



lobis cordis valde imbricatis  $\frac{1}{2}$  mm. longis, margine sursum irregulariter obscure-que denticulatis vel subintegris deorsum lasiniato-lobulatis, lobulis linearibus recurvis, vel peltatis elobatis. Stipes brevissimus 1 cm. longus complanatus supra planus subnullus glaber. Frons spathulata vel lineari-spathulata 4 cm. longa usque 9 mm. lata sursum infra apicem 6 mm. lata apice obtusissime vel rotundata valde crassa margine integerrima tenuiora anguste subcartilaginea, costa utraque pagine a basi usque ad medium tenuiter obscure visa a medio ad apicem non visa haud elevata; frons medio usque ad prope apicem sorifera. Sori a medio usque ad prope apicem frondis utroque latere costæ 1-seriatim dispositi perfecte rotundati  $2\frac{1}{2}$  mm. in diametro supra ad paginam plani, paraphysis numerosis peltatis angulato-rotundatis vel margine sublobatis.

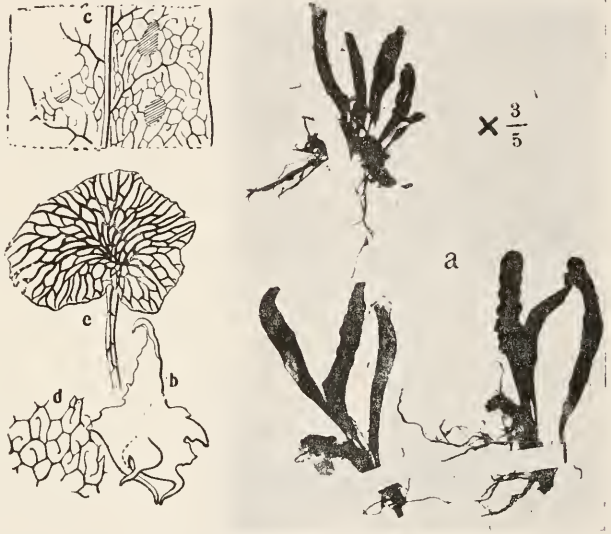


Fig. 175, *Polypodium obtusifrons* HAYATA; a, the fronds; b, a scale on the rhizome; c, a portion of the frond; d, reticulation of the veinlets; e, a paraphysis.

HAB. Kwannonzan, leg. T. SÔMA, 1910, Oct.

Near *P. lineare* TH. but differs from it by the very much shorter obtuse fronds with quite different venation. Still nearer to *Polypodium Onœi* Fr. et SAV. (MAKINO Phanerog. et Pterid. I. t. 10), but differs from it by the much complicated reticulation of the fronds which have more obtuse rounded apex.

***Polypodium pseudotrichomanoides* HAYATA sp. nov.** (Fig. 176). Rhizoma ascendento-erectum circ. 1 mm. crassum densissime radicans (radicibus fibrosis numerosis) densissime squamatum, squamis castaneo-fuscentibus tenuissimis sub luce traverso flavis ovato-lanceolatis usque  $1\frac{1}{2}$  mm. longis  $\frac{1}{3}$  mm. latis apice acuto-obtusis vel obtusis basi rotundatis. Stipes

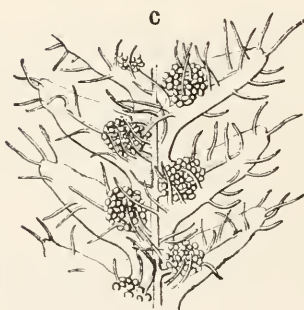


Fig. 176. *Polypodium pseudotrichomanoides* HAYATA; a, the plant; b, a scale on the rhizome; c, a portion of the frond; d, apical portion of the frond.

versus apicem  
rhizomatis dense  
cæspitosus bre-  
vissimus 1 mm.  
longus basi ad  
extremitatem  
2-3 squamatus  
semiteres. Frons  
linearis simplex  
vel a medio sur-  
sum furcata  
usque 13 cm.  
longa usque 6  
mm. lata apice  
gradatim an-  
gusta ad sum-  
mum obtusa vel  
a globulo termi-  
nata basilongeat-  
tenuata angust-  
ata ad stipitem  
brevem abeuns  
pinnatifida; rha-  
chis medio 1 mm.  
lata; segmentis  
mediis triangula-  
ri-linearibus la-  
tere superiore  $2\frac{1}{2}$   
mm. longis latere  
inferiore toti-  
usque longis  
apice obtusis basi  
 $\pm$  dilatatis 1 mm.

latis prope basin sorum singulorum gerentebus margine integris circ. angulo  $90^\circ$  vel  $85^\circ$  a rhachibus egressis a se  $1\frac{1}{2}$  mm. remotis, segmentis superioribus gradatim minoribus se approximatis, segmento terminali subnullo vel ad globulum minutum reducto, segmentis inferioribus gradatim minoribus se plus remotis prope basin frondis ad dentem triangularem  $\frac{1}{2}$  mm. longum obtusum reductis a se 2 mm. vel plus remotis ad extremitatem frondis ad alam angustissimam reductis, segmentis in sectione plano-convexis  $\infty$ -formibus supra convexis subtus planis; pagina suberassiuscula utraque præsertim ad costam parce strigoso-pilosa, pilis validis castaneo-nigris usque 1 mm. longis, supra ad costam anguste sulcata subtus plana, venis non elevatis simplicibus haud ramosis, costis subtus non sulcatis.

HAB. Arisan, leg. S. KUSANO; ibidem, leg. B. HAYATA et S. SASAKI, Jan., 1912.

Near *Polypodium trichomanoides* Sw., but differs from it in having simple veins and entire scales; from *P. Okuboi* YATABE and *P. setosum* METT. in having much narrower pinnae.

**Polypodium quasipinnatum** HAYATA Mater. Fl. Formos. p. 447.

Near *Pleopeltis Moulmeinensis* BEDD. Fern. Brit. Ind. t. 205, but differs from it by the sori arranged in two or three rows on each side of the costæ. Also very near *P. malacodon* HOOK.

**Polypodium rostratum** HOOK. (Fig. 177). HOOK. 1-st Cent. Fern. t. 53; BEDD. Fern. Brit. Ind. t. 159 et Handb. Fern. Brit. Ind. p. 347 fig. 193 cum nomine *Pleopeltis rostrata* HOOK.

HAB. In monte Morrison, ad 7000 ped. alt., leg. U. MORI, 1906, Dec. (No. 1896). Our fern closely resembles *P. rostratum* in the size, shape and texture of the fronds, but is a little different from it in the venation, as far as is concerned the figures in BEDD. Fern. Brit. Ind. t. 159, and HOOK. Ic. Pl. t. 953.

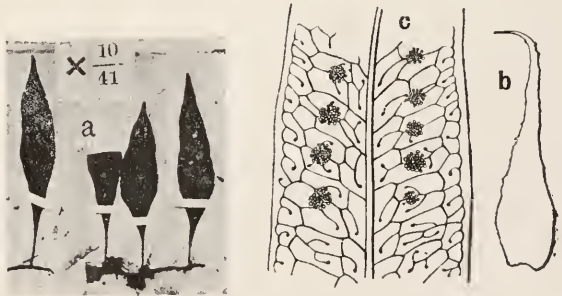


Fig. 177, *Polypodium rostratum* HOOK.; a, the plant; b, a scale; c, a portion of the frond.

The venation of our fern is more finely reticulated than that figured in Hook's work, but more loosely reticulated than that figured in BEDDOME's.

***Polypodium tenuissimum* HAYATA** sp. nov. (Fig. 178). Rhizoma breve tenne erectum apice dense squamatum apice stipites cæspitosum gerens, squamis tenuissimis fuscis oblongo-lanceolatis usque  $1\frac{1}{2}$  mm. longis  $\frac{1}{3}$  mm. latis apice obtusis bisetosis basi  $\pm$  rotundatis vel leviter cordatis. Stipes brevissimus 1-2 cm. longus ad apicem rhizomatis cæspitosus ad basin

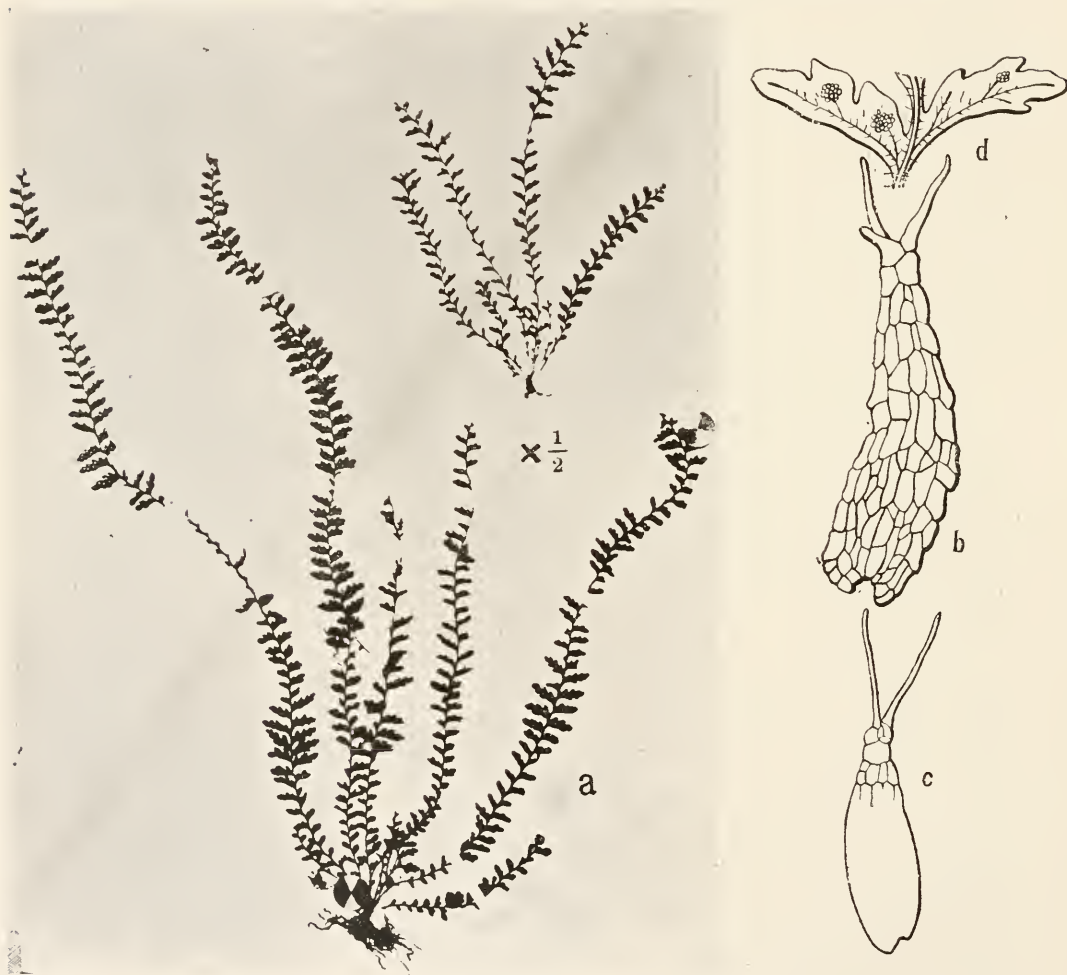


Fig. 178, *Polypodium tenuissimum* HAYATA; a, the plant; b, a scale on the rhizome; c, another smaller one; d, a portion of the frond.



squamatus supra basin sursum barbatus, barbis horizontaliter patentibus mollis 1-1½ mm. longis tenuissimis fuscentibus. Frons tenuissima utraque pagine præsertim ad costas venasque barbis mollis dispersa herbacea scandens usque 20 cm. longa 13 mm. lata apice acuminata ad summum obtusa basi gradatim attenuata circ. ad rhachin pinnatifida, segmentis mediis circ. 6 mm. longis 1-2 mm. latis sublineari-oblongis a rhachibus frondis 80°-70° egressis a se 3 mm. remotis apice obtusis basi latere inferiore decurrentibus margine latere superiore plus lobulatis quam latere inferiore, lobis 1 mm. longis obtusis; segmentis prope apicem subito vel gradatim minoribus ad lobos 2 mm. longos abeuntibus, segmento terminali 2 mm. longo obtuso, segmentis inferioribus gradatim minoribus, infimis ad dentem triangularem 1 mm. longum reductis; rhachis medio ½ mm. lata, costis utraque pagine elevatis, venis utraque pagine non visis parce ramosis. Sori sub basi lobulorum segmentorum singulariter siti rotundati ⅔ mm. in diametro.

HAB. Arisan, ad 8000-7000 ped. alt., leg. B. HAYATA et S. SASAKI, Jan., 1912.

Near *P. solidum* METT., but differs from it by the thinner herbaceous texture, bluntly lobed pinnæ, and hirsute fronds and venis; also near *P. cucullatum* and *P. trichomanoides*, but separable from them by the dentately lobed pinnæ; still nearer *Polypodium glandulosum* (HOOK. Sp. Fil. IV. p. 193, t. 276), from which our plant is distinguishable in having much narrower and much remoter pinnæ of very much thinner texture, and by the absence of glandular hairs.

### *Cyclophorus* DESV.

***Cyclophorus grandissimus*** HAYATA sp. nov. (Fig. 179). *Niphobolus grandissimus* HAYATA Herb. Taihoku. Epiphytica. Rhizoma repens subteres 8 mm. in diametro squamis dense obtectum, squamis lanceolato-linearibus usque 7 mm. longis basi usque 1½ mm. latis stramineo-castaneis. Stipes 40 cm. longus glaber complanato-teres vel tetragonus supra planus latere sulcatus castaneo-stramineus. Frons 40 cm. longa 8 cm. lata lanceolata apice acuminata supra medium usque ad basin æquilata sursum abrupte acuminata basi leviter auriculato-dilatata basi fere truncata margine subintegra vel obscure repanda facie plana ad basin undulata pagine supra glabra subtus dense stellato-tomentosa, costis supra planis subtus elevatis, venis lateralibus tenuis-

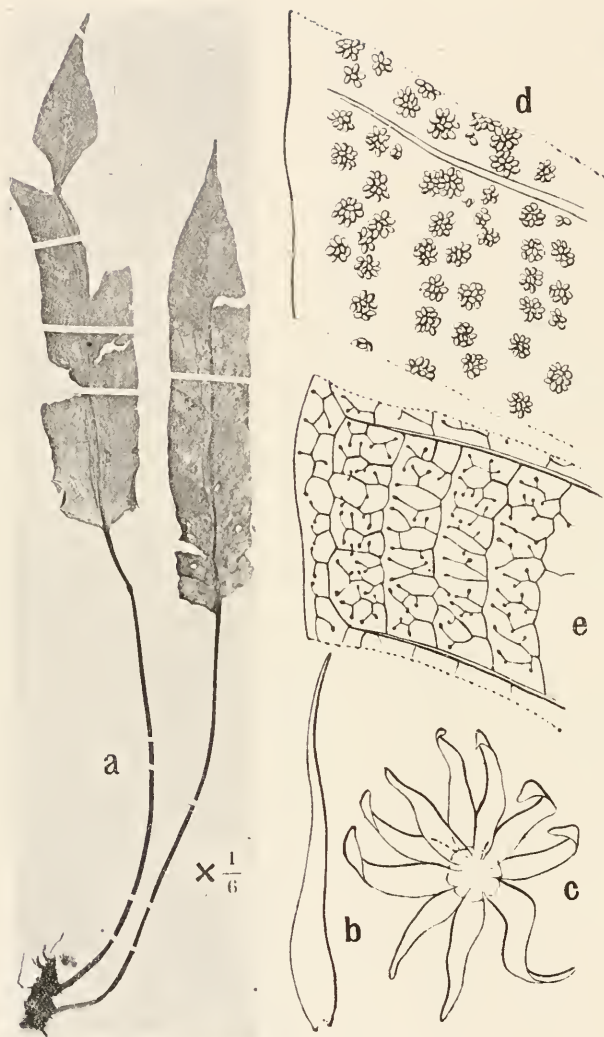


Fig. 179, *Cyclophorus grandissimus* HAYATA; a, the plant; b, a scale on the rhizome; c, a stellate hair on the frond; d, a portion of the frond, showing sori; e, the same, showing venation.

simis utraque pagine distincte visis a cota  $50^\circ$  divaricatis rectis mediis a se 8 mm. remotis; pagina supra atro-viridissima subtus dense ferrugineo-albescenti dense sorifera sed ad venas laterales non sorifera.

HAB. Arisan, leg. B. HAYATA et S. SASAKI, Jan., 1912.

Near *Niphobolus lingua* and *N. costata* (WALL.) BEDD. Fern. Brit. Ind. t. 120, but differs from them by the very much longer stipes and larger fronds with undulate margin and abruptly truncate somewhat auriculate base.

**Cyclophorus trans-**  
**morrisonensis** HAYATA  
sp. nov. (Fig. 180). Rhizoma breve suberectum? apice squamis dense obtectum, squamis lanceolatis  $2\frac{1}{2}$  mm. latis acuminatis basi latioribus

cordatis margine ciliato-fimbriatis. Stipes 1 cm. longus non squamatus obscure subalatus dense pilosus, pilis stellatis. Frons lanceolata 3–5 cm. longa crassiuscula primum utraque pagine densissime stellato-pilosa demum supra dense vel parce pilosa subtus semper densissime pilosa supra parce

depresso-punctata apice attenuato-obtusa vel obtusa basi gradatim attenuata margine integra exsiccato vel humido superne recurvo-revoluta subtus dense sorifera; costa utraque pagine non visa. Sori rotundati minus 1 mm. in diametro irregulariter dense approximativim dispositi.

HAB. Montibus centralibus, ad 10000 ped. alt., leg. U. MORI, 1906, (No. 2363).

*Niphobolus transmorrisonensis* HAYATA in sched. herb. Taihoku.

*Niphobolus fissus* HAYATA Mater. Fl. Formos. p. 448 (non BLUME). Near *N. fissus* BLUME, but differs from it by the fronds which are pilose on both sides.

***Elaphoglossum* SCHOTT.**

***Elaphoglossum conforme* MOORE;** BEDD. Fern. South Ind. t. 198 et Handb. Fern. Brit. Ind. p. 416 fig. 247.

HAB. Arisan, 6000-7000 ped. alt., B. HAYATA et S. SASAKI, Jan., 1912.

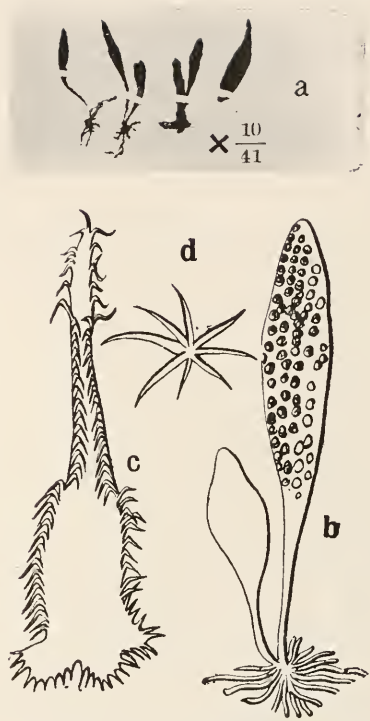


Fig. 180, *Cyclophorus transmorrisonensis* HAYATA; a, the plant, (reduced); b, the same; c, a scale on the rhizome; d, a stellate hair on the frond; b, natural size.





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IV.

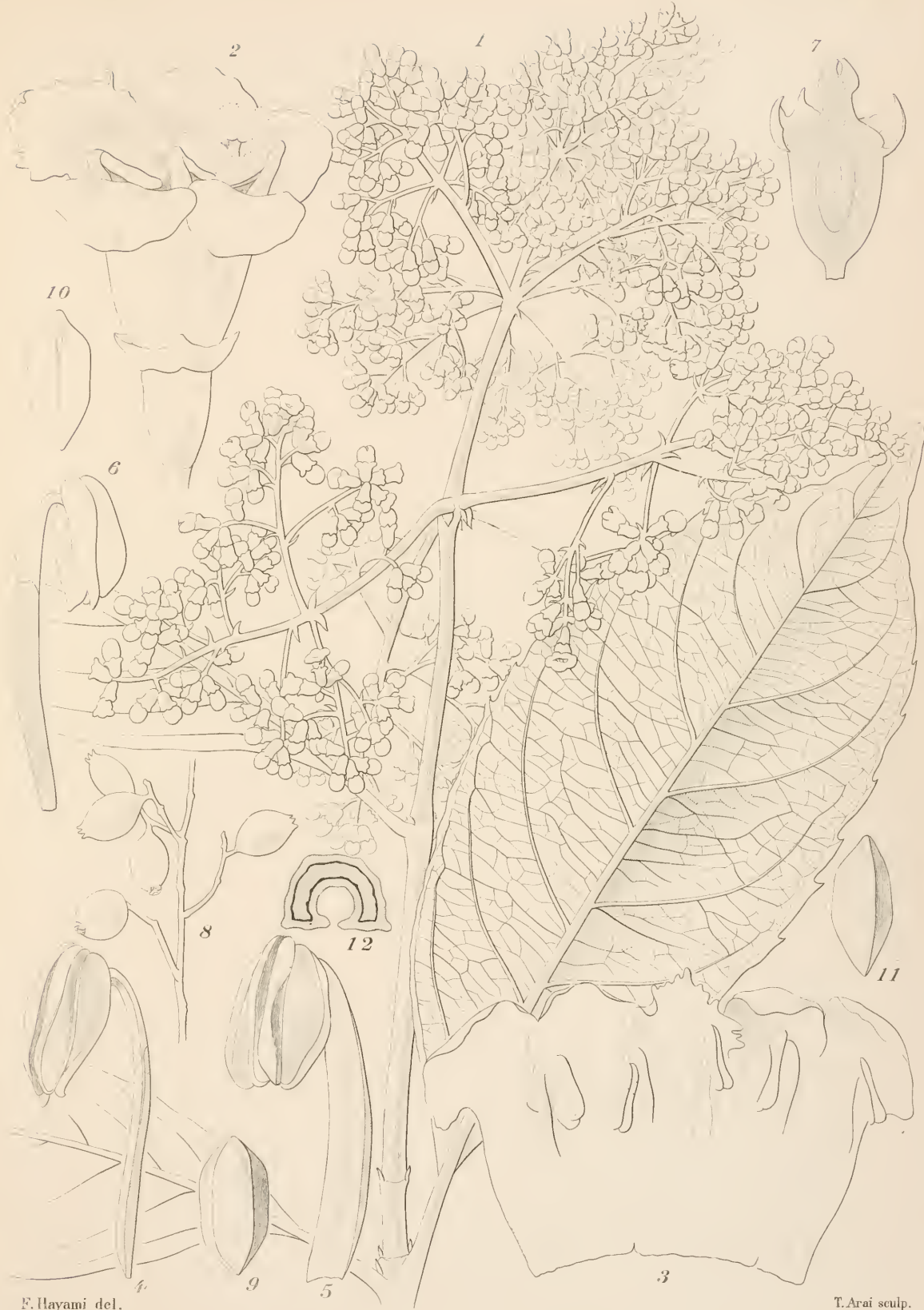
PLATE I.

## Explanation of Pl. I.

*Viburnum arboricolum* HAYATA.

- Fig. 1. A branch.  
2. A flower.  
3. Corolla, expanded.  
4. 5. 6. Stamens, seen from different sides.  
7. An ovary in vertical section.  
8. Fruits.  
9. 10. 11. Putamens, seen from different sides.  
12. Cross section of a putamen.







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IV.

PLATE II.

## Explanation of Pl. II.

*Viburnum melanophyllum* HAYATA.

- Fig. 1. A branch.  
2. A stellate hair on a leaf.  
3. Corolla of a margin flower.  
4. A fertile flower.  
5. Corolla of the same.  
6. An ovary with calyx and an ovoid style.  
7. Stamens, seen from different sides.







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IV.

PLATE III.

### Explanation of Pl. III.

*Viburnum propinquum* HEMSL.

- Fig. 1. A branch.  
2. A flower.  
3. Corolla expanded.  
4. A stamen.  
5. Calyx and style.



1





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IV.

PLATE IV.

### Explanation of Pl. IV.

*Quercus kodaihoensis* HAYATA.

- Fig. 1. A branch.  
2. A leaf.  
3. A fruit.  
4. A glans.







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IV.

PLATE V.

## Explanation of Pl. V.

*Liparis dolichopoda* HAYATA.

- Fig. 1. The plants in the habitat, (reduced).  
2. The plant.  
3. A part of inflorescence.  
4. A flower.  
5. A lip, seen from front.  
6. The same, seen from back.  
7. The same, showing its apex.  
8. The same, seen from side.  
9. Apical portion of the same, very much magnified.  
10. A column, seen from face.  
11. The same, seen from side.  
12. The same, in section.  
13. An anther, seen from back.  
14, 15. A pollinium, seen from different sides.





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K. Nakazawa sculp.



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IV.

PLATE VI.

## Explanation of Pl. VI.

*Liparis Somai* HAYATA.

- Fig. 1. The plant.  
2. A flower.  
3. The same, seen from side.  
4. A dorsal sepal.  
5. A lateral sepal.  
6. A petal.  
7, 8, 9. A lip, seen from different sides.  
10. A column.  
11. The same, in section, seen from side.







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IV.

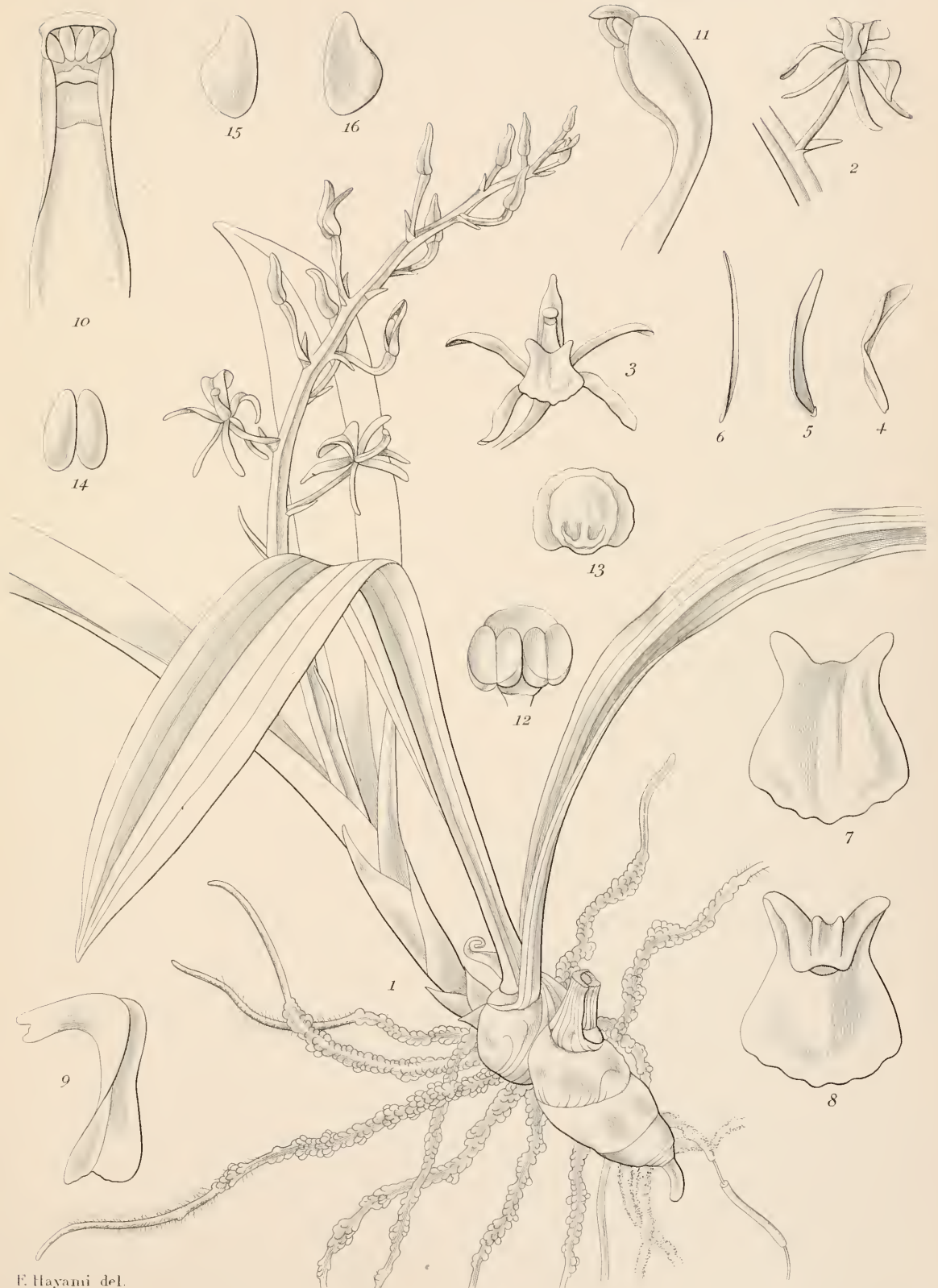
PLATE VII.

## Explanation of Pl. VII.

*Liparis taiwaniana* HAYATA.

- Fig. 1. The plant.  
2. A part of inflorescence.  
3. A flower.  
4. A dorsal sepal.  
5. A lateral sepal.  
6. A petal.  
7, 8, 9. A lip, seen from different sides.  
10. Column, seen from front.  
11. The same, seen from side.  
12. An anther, lifted from the column.  
13. The same, seen from back.  
14. Pollinia.  
15, 16. Pollinium, seen from different sides.





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K. Nakazawa sculp.



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IV.

PLATE VIII.

## Explanation of Pl. VIII.

*Dendrobium longicalcaratum* HAYATA.

- Fig. 1. The plant.
2. A flower, seen from face, lip taken aside.
3. The same, seen from back.
4. The same, seen from front, spur partially taken off to show  
the column and mentum.
5. A dorsal sepal.
6. A lateral sepal detached from the mentum.
7. A petal.
8. A lip, seen from within.
9. A portion between the claw and lamina of the lip, seen from back.
10. Column, seen from side.
11. The same, seen from back.
12. The same, in section, seen from side.
13. The same, seen from back.
14. An anther with a gland.
15. The same, seen from back, pollinia taken off.
16. The same, with pollinia.
17. Pollinia.
18. The same, seen from below.





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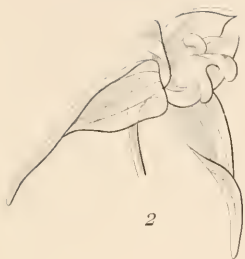
PLATE IX.

## Explanation of Pl. IX.

*Bulbophyllum Inabai* HAYATA.

- Fig. 1. The plant.  
2. A flower.  
3. A dorsal sepal.  
4. A lateral sepal.  
5. A petal.  
6. Mentum and lip.  
7. Columna.  
8. The same, seen from back.  
9. The same, medially cut.  
10. An anther.  
11. The same, seen from back.  
12. Pollinia.  
13. A pollinium, seen from the outer side.  
14. The same, seen from the inner side.







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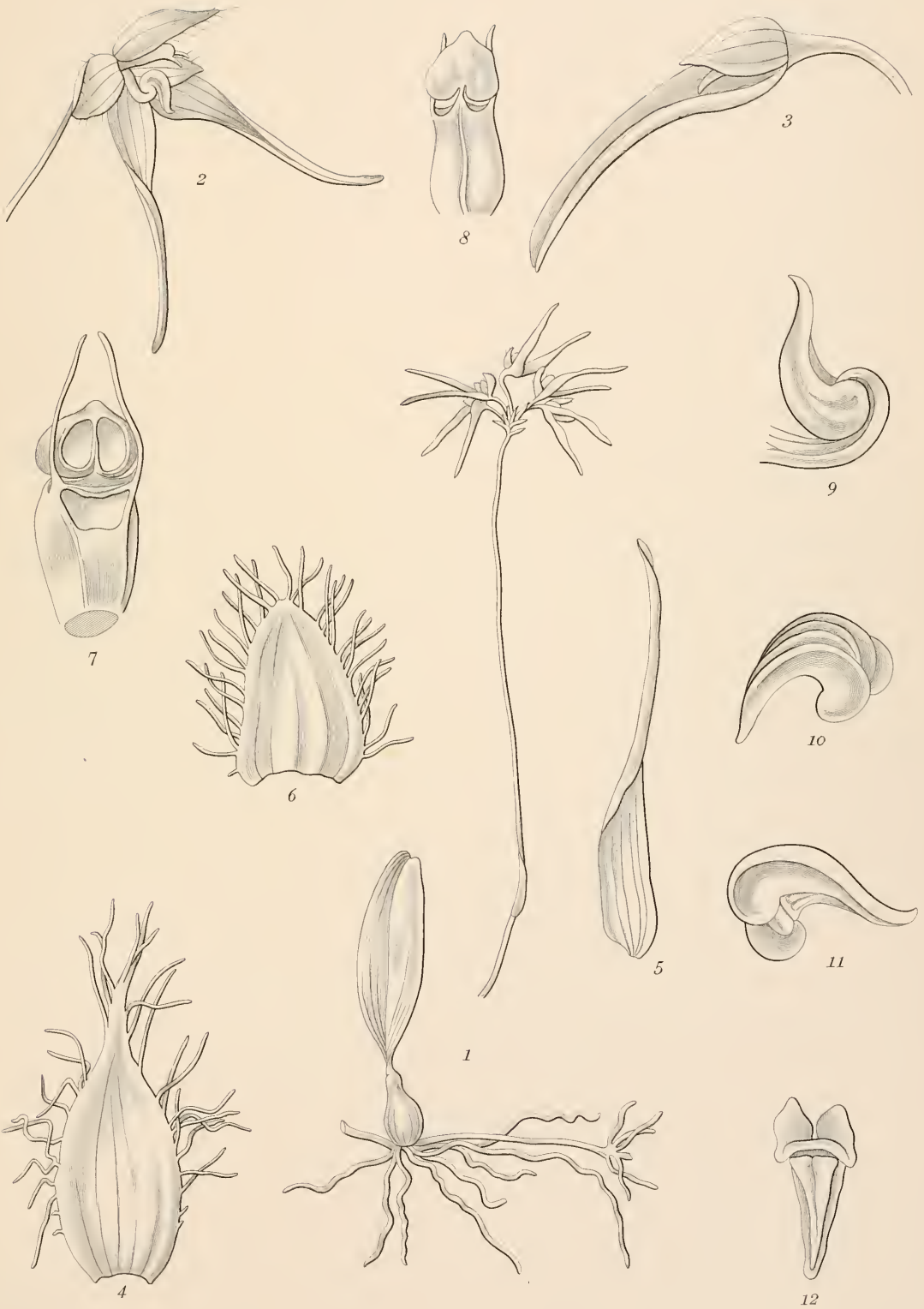
PLATE X.

### Explanation of Pl. X.

*Bulbophyllum melanoglossum* HAYATA.

- Fig. 1. The plant.  
2. A flower (lateral sepals are artificially expanded).  
3. The same, seen from side.  
4. A dorsal sepal.  
5. A lateral sepal.  
6. A petal.  
7. A column.  
8. The same, seen from back.  
9. 10. 11. 12. A lip, seen from different sides.





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K. Nakazawa sculp.



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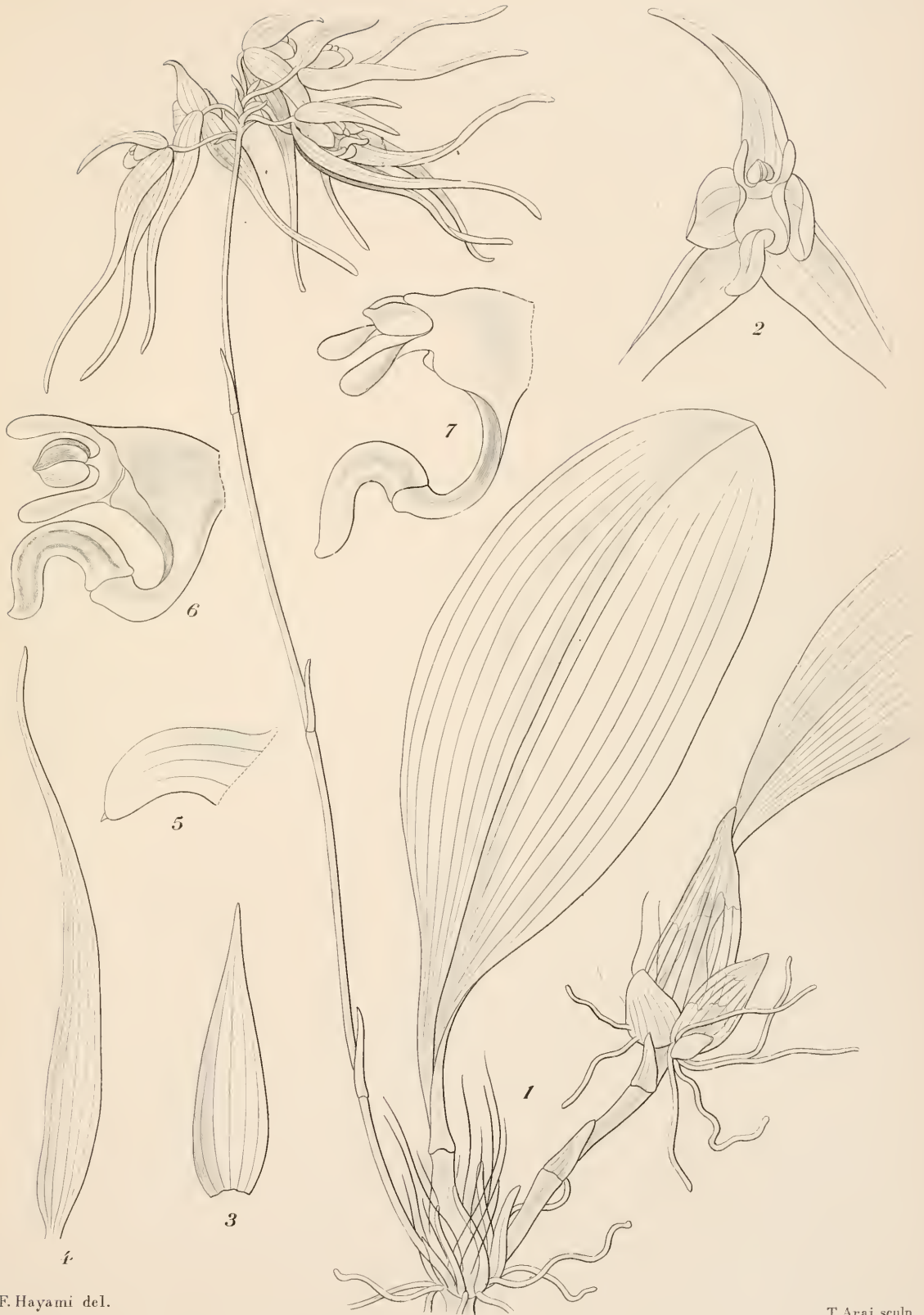
PLATE XI.

### Explanation of Pl. XI.

*Bulbophyllum uraiense* HAYATA.

- Fig. 1. The plant.  
2. Central portion of a flower.  
3. A dorsal sepal.  
4. A lateral sepal.  
5. A petal.  
6. Column, mentum and lip.  
7. The same, seen from a different side.







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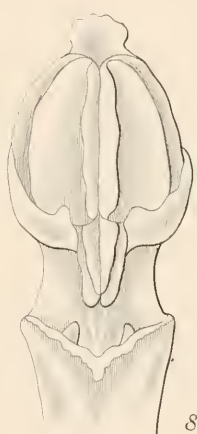
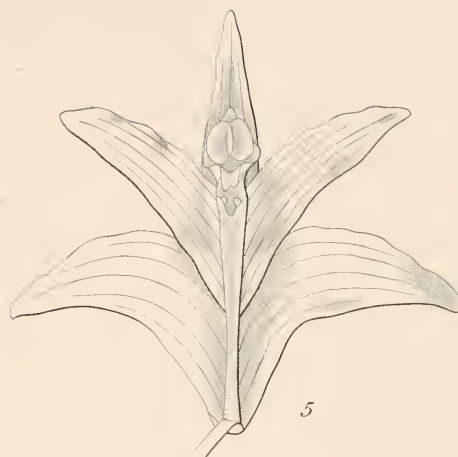
PLATE XII.

## Explanation of Pl. XII.

*Eria arisanensis* HAYATA.

- Fig. 1. The plant.  
2. A flower.  
3. The same, seen from side.  
4. The same, seen from back.  
5. The same, seen from face, lip taken off.  
6. A lip.  
7. The same, medially cut.  
8. Apical portion of a column.  
9. The same, seen from side.  
10. The same, in section.







ICONES PLANTARUM FORMOSANARUM.

IV.

PLATE XIII.

### Explanation of Pl. XIII.

*Calanthe caudatilabella* HAYATA.

- Fig. 1. The plant.  
2. A flower.  
3. A dorsal sepal.  
4. A lateral sepal.  
5. A petal.  
6. Column and lip.  
7. The same in section.  
8. The same, anther taken off.  
9. Rostellum, clinandrium and anther.  
10. 11. 12. Anther, seen from different sides.







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IV.

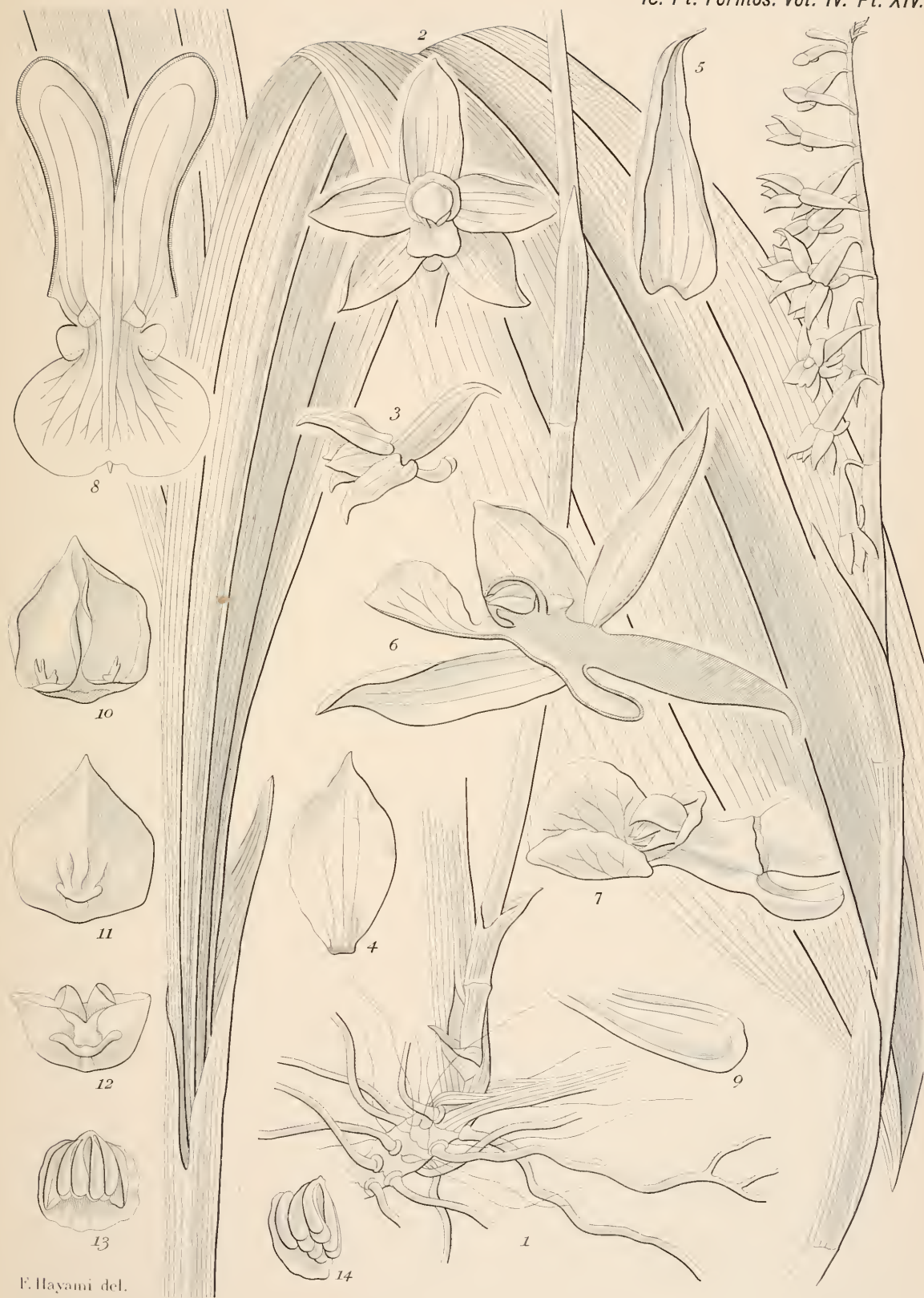
PLATE XIV.

## Explanation of Pl. XIV.

*Calanthe forsythiiflora* HAYATA.

- Fig. 1. The plant.  
2. A flower.  
3. The same, seen from side.  
4. A petal.  
5. A lateral sepal.  
6. A flower, medially cut.  
7. The same flower, sepals and petals taken off, showing column and lip.  
8. A lip, spur medially cut and explicated.  
9. A spur.  
10. 11. 12. An anther, seen from different sides.  
13. 14. Pollinarium, seen from different sides.





E. Hayami del.

K. Nakazawa sculp.



ICONES PLANTARUM FORMOSANARUM.

IV.

PLATE XV.

## Explanation of Pl. XV.

*Ancætochilus bisaccatus* HAYATA.

- Fig. 1. The plant.  
2. A flower.  
3. A dorsal sepal and two petals forming a hood.  
4. The same, a dorsal sepal and petals detached.  
5. A lateral sepal.  
6. A lip.  
7. A column, seen from side, anther a little lifted.  
8. Apical portion of a column.  
9. The same column with the basal portion of the lip.  
10. Basal portion of the same lip.  
11. The same, seen from below.

r, =rostellum; st, sh, s=stigma; a, an=anther; ap=columnal  
appendages; ra, =lateral lobes of the clinandrium; ca=basal  
appendages of the lip.







ICONES PLANTARUM FORMOSANARUM.

IV.

PLATE XVI.

## Explanation of Pl. XVI.

*Anectochilus Inalai* HAYATA.

- Fig. 1. The plant.
2. A flower, seen from above.
3. The same, seen from below.
- 4'. A dorsal sepal and petals, forming a hood.
4. The same sepal and petals detached.
5. Two lateral sepals.
6. Central portion of a flower; an=anther, ap=columnal appendages; g=gland.
7. Apical portion of a column, anther taken off; c=clinandrium; r=rostellum; ap=columnal appendage.
8. An anther, seen from below; g=gland.



F. Hayami del.

K. Nakazawa sculp.





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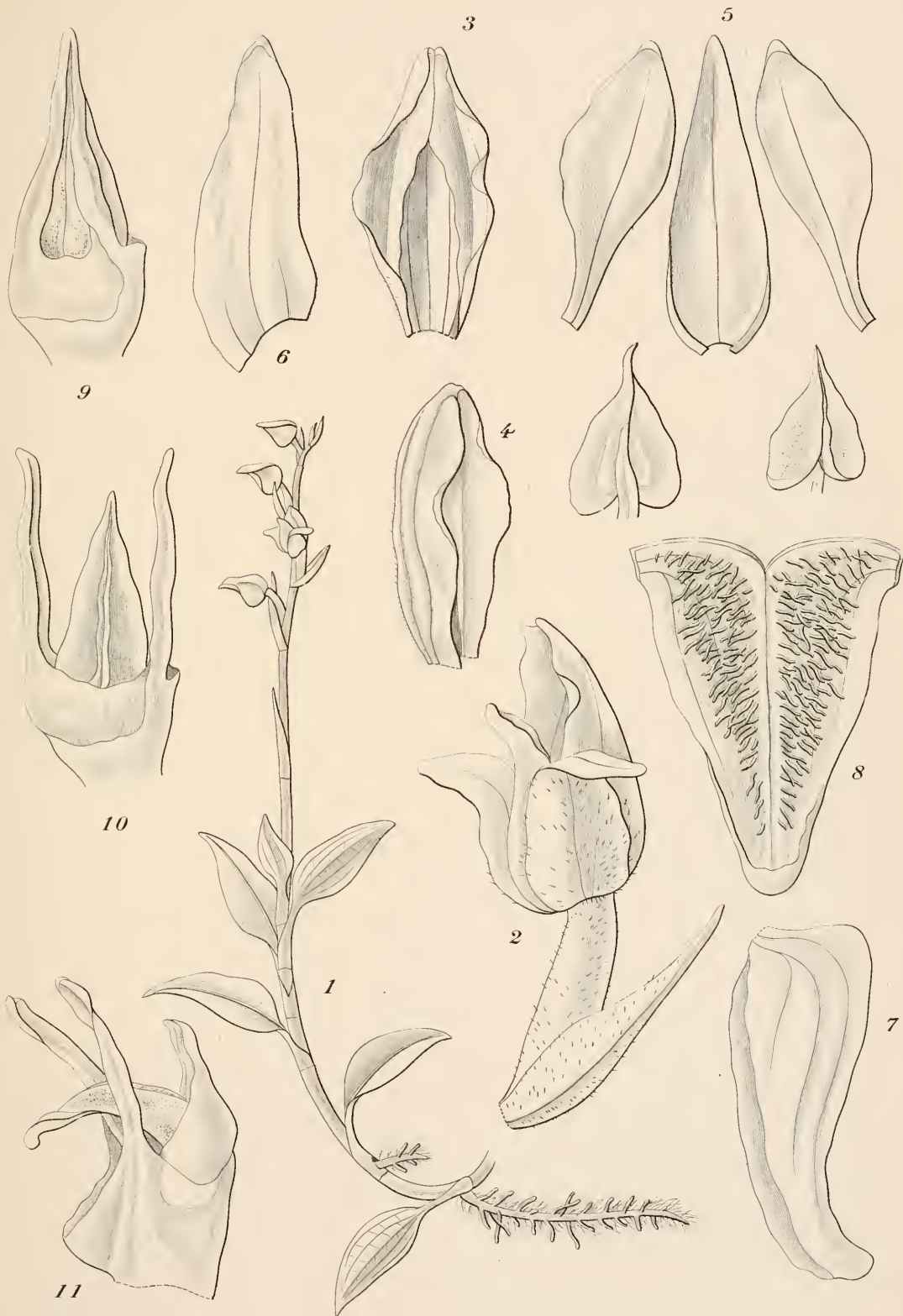
IV.

PLATE XVII.

## Explanation of Pl. XVII.

*Goodyera morrisonicola* HAYATA.

- Fig. 1. The plant.  
2. A flower.  
3. A dorsal sepal and two petals forming a hood, seen from within.  
4. A dorsal sepal, seen from side.  
5. A dorsal sepal and two petals detached.  
6. A lateral sepal.  
7. A lip, seen from side.  
8. The same, explicated, seen from within.  
9. Column, seen from front.  
10. The same, rostellum expanded.  
11. The same, seen from side.  
12. An anther, seen from back.  
13. The same, seen from face.





ICONES PLANTARUM FORMOSANARUM.

IV.

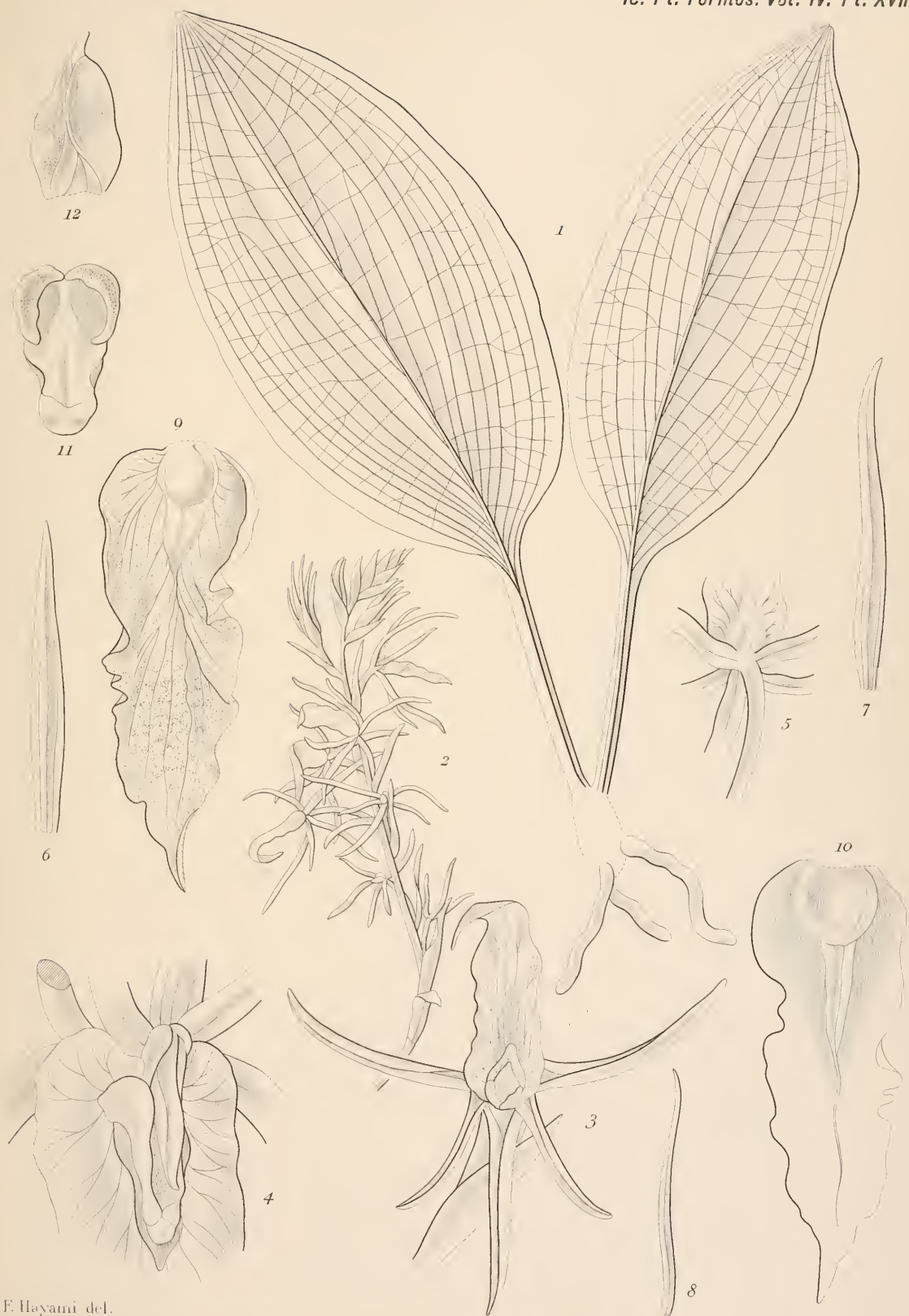
PLATE XVIII.



## Explanation of Pl. XVIII.

*Cryptostylis erythroglossa* HAYATA.

- Fig. 1. The plant.  
2. Inflorescence.  
3. A flower.  
4. Central portion of a flower.  
5. The same, seen from back.  
6. A dorsal sepal.  
7. A lateral sepal.  
8. A petal.  
9. A lip.  
10. The same, seen from back.  
11. A clinandrium.  
12. An anther.



F. Hayami del.

K. Nakazawa sculp.



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IV.

PLATE XIX.

### Explanation of Pl. XIX.

*Nervilia purpurea* (HAYATA).

- Fig. 1. The plant with a leaf.  
2. A portion of a leaf, showing lamellate hairs.  
3. The plant with a scape.  
4. Another scape.  
5. A lip.  
6. A column, seen from side.  
7. Apical portion of the same, anther lifted.  
8. A column, seen from back.  
9. An ovary.







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IV.

PLATE XX.

## Explanation of Pl. XX.

*Galera kusukusensis* HAYATA.

- Fig. 1. The plant.  
2. A scale on a rhachis.  
3. A flower.  
4. The same, segments expanded.  
5. A dorsal sepal.  
6. A petal.  
7. lip, seen from face.  
8. The same, seen from side.  
9. A column and an anther, seen from side.  
10. A column, anther taken off.  
11. An anther.



E. Hayami del.

K. Nakazawa sculp.





ICONES PLANTARUM FORMOSANARUM.

IV.

PLATE XXI.

### Explanation of Pl. XXI.

*Platanthera pachyglossa* HAYATA.

- Fig. 1. The plant.  
2. A flower.  
3. The same, seen from side.  
4. The same, seen from back.  
5. Central portion of a flower.  
6. The same in vertical section.  
7. Column, seen from side.  
8. 9. Pollinarium, seen from different sides.



F. Hayami del.

K. Nakazawa sculp.





ICONES PLANTARUM FORMOSANARUM.

IV.

PLATE XXII.

### Explanation of Pl. XXII.

*Habenaria goodyeroides* DON. var. *formosana* HAYATA.

- Fig. 1. The plant.  
2. A flower.  
3. The same, seen from side.  
4. The same, seen from back.  
5. A dorsal sepal.  
6. A lateral sepal.  
7. A petal.  
8. A lip.  
9. 10. Pollinarium, seen from different sides.



E Hayami del.

K. Nakazawa sculp.



ICONES PLANTARUM FORMOSANARUM.

IV.

PLATE XXIII.



### Explanation of Pl. XXIII.

*Hebenaria linearipetala* HAYATA.

- Fig. 1. The plant.  
2. A flower.  
3. A dorsal sepal.  
4. A lateral sepal.  
5. A petal.  
6. A lip.  
7. Central portion of a flower.  
8. 9. A staminode, seen from different sides.  
10. A stigma.  
11. The same, seen from back.



E. Hayami del.

K. Nakazawa sculp.



ICONES PLANTARUM FORMOSANARUM.

IV.

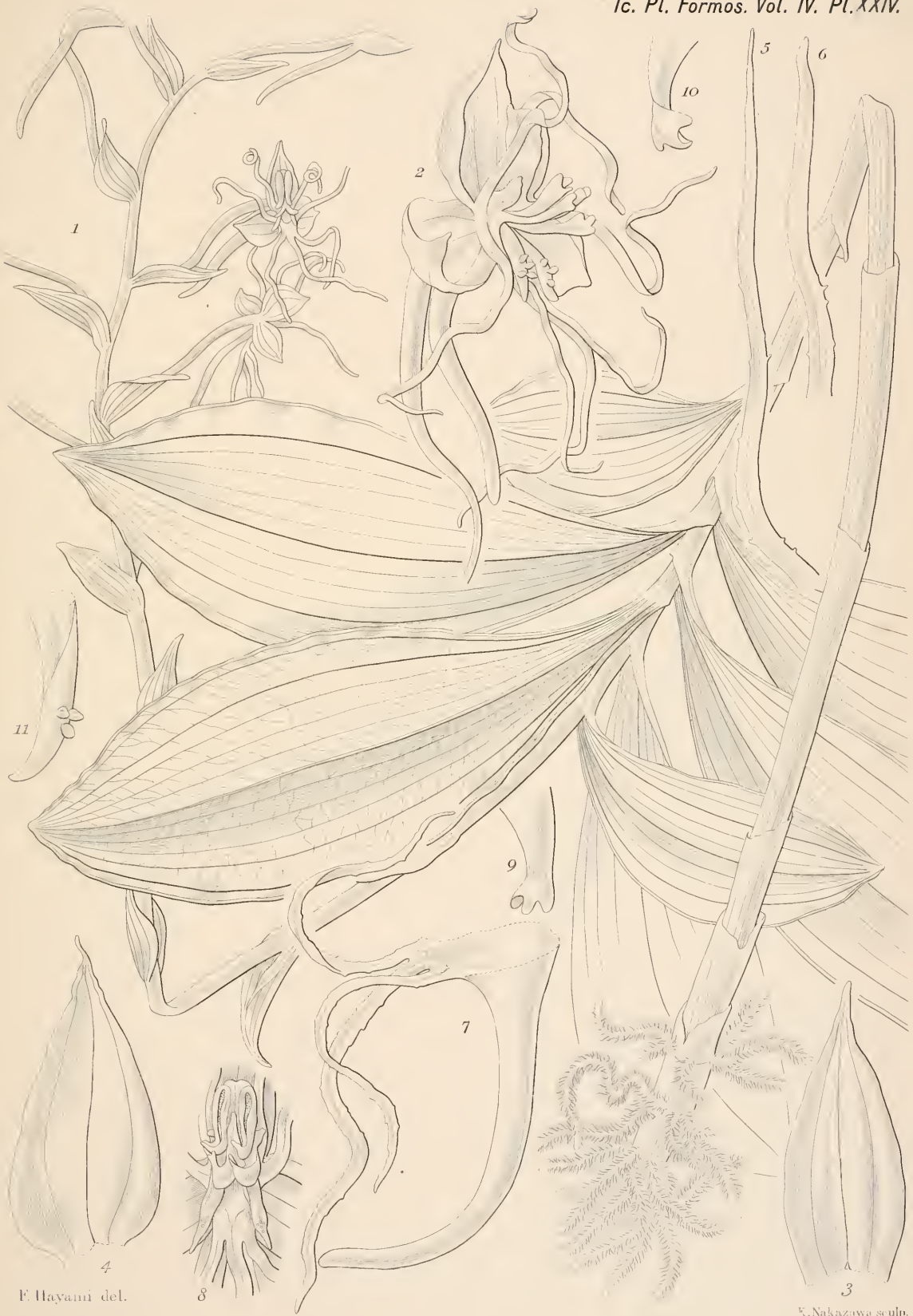
PLATE XXIV.

### Explanation of Pl. XXIV.

*Habenaria longitentaculata* HAYATA.

- Fig. 1. The plant.  
2. A flower.  
3. A dorsal sepal.  
4. A lateral sepal.  
5. 6. Lobes of a petal.  
7. A lip.  
8. central part of the flower.  
9, 10. Staminodes.  
11. Stigma.





F. Hayami del.

K. Nakazawa sculp.



ICONES PLANTARUM FORMOSANARUM.  
IV.

PLATE XXV.

## Explanation of Pl. XXV.

*Hemipilia formosana* HAYATA.

- Fig. 1. The plant.  
2. A flower.  
3. The same, seen from face.  
4. A dorsal sepal.  
5. A lateral sepal.  
6. A petal.  
7. A lip.  
8. A column and lip, seen from side.  
9. Apical portion of a column.  
10. The same, seen from side.  
11. The same, in section.  
12. The same, seen from back.  
13. 14. Pollinarium, seen from different sides.













